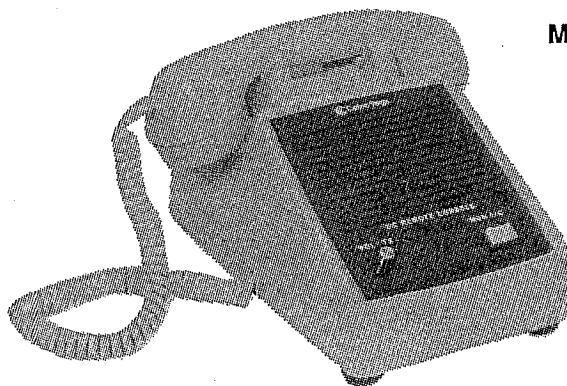


Vega[®] a MARK IV company
Signaling Products

Instruction Manual

098-0319

Models C-530 and C-531 DC-Remote Control Consoles



Model C-530



Model C-531

General

Vega's DC-remote consoles provide reliable remote control of the various functions of a two-way radio base station.

Models C-530 and C-531 consoles are normally used in conjunction with functionally matching DC control adapters located at the base station. Models C-530 and RA-230 are one such functionally matching pair. The C-530 and C-531 are compatible with Motorola, GE, and other DC radio control systems.

A Vega DC control console is connected to the remote base station by means of a 600-ohm twisted-pair line or by a leased telephone-company metallic line. The connecting line may be as short as 100 feet or as long as 90 miles (requires low-loss line).

Multiple DC consoles may be used on a single line without seriously affecting performance.

The C-530 performs the PTT, monitor, and intercom functions. The C-531 may be programmed for up to eight functions: TX F1, TX F2, RX F1, RX F2, MON F1, and MON F2. In addition, the C-531 uses solid-state switching (no relays), has provisions for a separate DC control line, and has a provision for lower voltage operation, allowing Class 2 (telephone wire style) wiring where building codes would otherwise require Class 1 (conduit or equivalent) wiring.

Operation

The C-530 and C-531 DC-remote control consoles are designed for maximum ease of operation. Minimum operator familiarization is required. The following controls and indicator can be identified from the front-cover photographs:

- **Volume Control:** Adjusts both speaker and earpiece audio level.
- **Transmit PTT Switch:** Push-to-talk (generates PTT control current) and release-to-listen; located on the handset.
- **Transmit Lamp:** When on, indicates that console is transmitting (required by FCC Rules).
- **Intercom:** When pressed, allows the operator to talk into the network (such as to a parallel console or to a technician at the remote base station) without keying the remote transmitter. The PTT switch is not pressed for this function.
- **Monitor:** When pressed, causes the base-station receiver with a subaudible-tone (CTCSS or continuous tone-coded squelch system) decoder to monitor all activity on the radio channel, by disabling the CTCSS decoder. This function minimizes the possibility of accidentally interfering with other co-channel users, and is required by FCC rules for stations equipped with CTCSS. The monitor function may also be solder-bridge programmed to be activated when the handset is lifted off hook.

■ **Speaker Disable:** The speaker is connected whenever the handset is on hook, and is disconnected whenever the handset is off hook. This allows hands-free listening for calls and telephone-style communications when initiating or answering a call. The speaker may also be made active when off hook by closing a solder bridge.

■ **F1/F2 Selection (C-531 only):** When the F1/F2 switch position is changed, a different DC control current is generated upon PTT. This causes a two-frequency station to switch to the desired channel. Also, yet another different control current is generated in the F2 receive condition (single-frequency receive and F1 in two-frequency systems is always zero control current). The F1/F2 selector switch also causes different currents to be generated when the monitor switch is pressed. This allows monitoring only the channel of interest before transmitting.

NOTE: Only one current can flow through the line at one time. If one console in a parallel-console system is generating a continuous current, this current will add or subtract from the current generated by another console. This usually results in a wrong "command" to the base station. For this reason, the use of receive F2 programming is not recommended for multiple console use, because the presence of RX F2 current is not indicated on a parallel console.

Voice signals and clicks caused by line-current changes are audible at parallel consoles, thereby providing an audible indication of activity or of commands being generated elsewhere in the radio system.

Typical Applications

The C-530 or C-531 console can be used as a single unit or in parallel with other consoles on the same network, to control a remote base-station radio. As shown in Figure 1, two consoles are connected to a single leased telephone-company metallic line feeding a DC remote control adapter at the base station. Either console can exercise full control over the remote base station by use of the handset and switches.

All network activity, whether from a radio transmission or from a parallel console, can be monitored over either the speaker or the handset. Thus it is unlikely that one console operator would inadvertently interfere with any other console operator. One console operator can

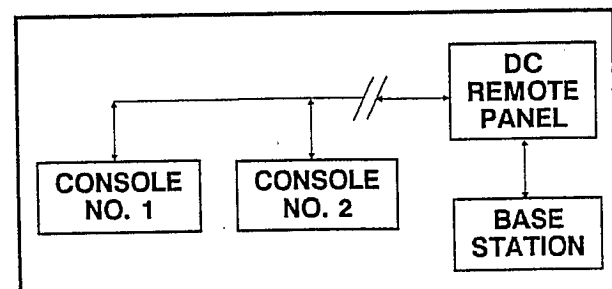


Figure 1. Overall system block diagram.

talk with another console operator, without keying the remote base transmitter, simply by pressing the intercom switch on the front panel.

The interconnections shown in Figure 1 are typical. Additional consoles may be connected to the common leased telephone line to control the remote base station. (Custom Vega consoles are available for selecting lines to other remote base stations, controlling other functions or status monitoring. Contact the Vega factory for assistance with your special system requirements.)

Installation

The C-530 or C-531 DC remote control console may be installed in any location convenient to the operator. Exposure to extreme dampness, temperature, and radio-frequency energy should be avoided for maximum life and reliability.

Base stations are often located at high elevations or other locations where lightning is a hazard. Above-ground DC lines also tend to attract lightning.

The C-530 and C-531 line inputs are diode-protected from line transients up to a certain point, but protection from lightning-induced high-voltage/high-current transients on the DC line has not been provided.

Vega will not repair or replace units during the warranty period which have obvious high-voltage damage such as vaporized PC-board traces or melted components.

If the DC line is a leased telephone-company metallic line, lightning protection is almost always provided at the line entrance to the building. Customer-supplied above-ground lines should include lightning protection such as North Supply #561034 gas-discharge-tube devices located at the entrance to the building.

Additional protection such as North Supply #S-568015 gas-tube protectors may be installed inside the console.

The C-530 is factory prepared for single console, +15 mA PTT current, -2.5 mA monitor current, typical mic sensitivity, and receive sensitivity set for typical audio attenuation of 4 to 12 miles of DC line. For multiple consoles, different current requirements, or other line attenuation, refer to DISASSEMBLY instructions.

The C-531 is factory-prepared for single console, +6 mA TX F1, +15 mA TX F2, -2.5 mA MON F1, MON F2, and RX F1 and F2 at 0 mA. For other current programming, nontypical mic-sensitivity requirements, audio attenuation nontypical of 4 to 12 miles of line, or multiple consoles, refer to DISASSEMBLY instructions.

Disassembly And Setup

WARNING: There is exposed 117 Vac and 130 Vdc inside the console. Unplug the line cord before opening. This also prevents accidental shorts during disassembly.

Access to internal jumpers and controls is obtained by loosening two large screws on the bottom of the

console and "folding" the case forward. This procedure opens up the entire unit for setup or maintenance.

Multiple Console Operation

For two or more parallel consoles, on all consoles open JP8 on the C-530 or JP4 on the C-531 with an Exacto knife.

Off-hook Speaker Operation

For off-hook speaker operation, close JP1 (C-530) or JP3 (C-531) with a soldering iron. In this mode of operation the speaker is always enabled. Feedback may occur from the sidetone signal present from transmit or intercom, if both the volume and mic sensitivity controls are set near maximum.

Off-hook Monitor

Close JP2 (C-530) or JP5 (C-531) with a soldering iron for automatic monitor when off hook.

Level Adjustments

The console level controls are set to a mark on the PC board, which gives typically required mic and line input sensitivity, and approximately 0 dBm line output for single-console operation.

Line-input-sensitivity control R9 on the C-530 and R13 on the C-531 drives the console approximately 6 dB into compression at -12 dBm line input. For the proper adjustment of this control, typical voice or a test tone from the base station should be used. Adjust R9 (C-530) or R13 (C-531) from minimum until the level at TP3 (C-530) or TP1 (C-531) stops rising linearly, and turn slightly farther clockwise. Do not adjust for a large amount of compression, because this will greatly increase line noises during voice pauses.

Line-output-level control R6 (C-530) or R11 (C-531) as factory adjusted will drive a 600-ohm line at about 0 dBm, which is about the maximum allowed by the telephone companies for a leased line. 0 dBm is also the recommended level for 600-ohm twisted-pair lines for distances up to 12 miles. This control should always be adjusted when multiple consoles are used, because the output load is less than 600 ohms. Adjust with all parallel consoles connected and powered. In single console systems, the line output can be set with an output meter or oscilloscope at TP6 (C-530) or TP2 (C-531). Line output will be about 4.5 dB higher than that measured at TP6. Therefore, for 0 dBm line, set TP6 (C-530) or TP2 (C-531) for -4.5 dBm or 1.3 V_{p-p}. For a two-console system, with JP8 (C-530) or JP4 (C-531) open, set TP6 (C-530) or TP2 (C-531) to +3.5 dBm to 3.3 V_{p-p} for 0 dBm line. Increase the TP6 (C-530) or TP2 (C-531) reading 3 dB for every additional console above two. When the line output control is set near maximum, monitor TP6 (C-530) or TP2 (C-531) with an oscilloscope to insure that clipping is not occurring.

Mic sensitivity control R4 (C530) or R8 (C-531) should be set with normal voice input to the handset microphone while monitoring TP6 (C-530) or TP2 (C-

531). Adjust R4 (C-530) or R8 (C-531) clockwise from minimum until TP6 (C-530) or TP2 (C-531) output no longer increases at the rate proportional to R4 (C-530) or R8 (C-531) rotation. Do not adjust to maximum for a loud-voice person. This will produce unnecessary room-noise pickup without increasing output.

Line-current Programming

Model C-530—If line current other than +15 mA PTT and -2.5 mA monitor is desired, refer to the schematic or to the PC-board screen, open the appropriate solder bridge with an Exacto knife, and close the appropriate solder bridge with a soldering iron.

Model C-531—Refer to the schematic and to the PC-board screen. Determine the current and polarity required by the DC adapter at the base station for each function. Functions not required by the base-station adapter may be left unprogrammed (no jumper plug in that column) or console functions may be programmed for the same current. Example: F2 not required—Program TX F1 and TX F2 for identical currents and MON F1 and MON F2 for identical currents, and leave RX F2 unprogrammed. This provides F1 operation regardless of the position of the F1/F2 switch.

With the 9/15-mA jumper plug in the 9-mA position, 15-mA programming is unavailable in either polarity for any function. The reverse is, of course, also true.

No more than one jumper plug should be installed in any programming column, because this causes unusual internal and/or external currents.

Low-Voltage Operation

Moving the 125-V_{dc} jumper plug to the 85-V_{dc} position reduces the high-voltage current-supply voltage to under 100 V_{dc} at high power-line voltages. This allows Class 2 (nonconduit) wiring when the higher voltage would otherwise require Class 1 (conduit) wiring due to electrical building codes.

This lower current-supply voltage will not allow as long a DC line between the consoles and the base station unless the base station can be programmed to operate on lower currents. The DC-line loop resistance at the lower voltage is limited to 4000 ohms if 15-mA programming is used, but is increased to 6670 ohms if 9-mA programming is used, and 10,000 ohms if 6 mA is the highest programmed current.

Loop Resistance, Audio Attenuation, and Maximum Line Length

Allowing for low AC line voltage and the resistance increase of copper wire at high temperatures, the maximum loop resistance that should be used with the C-530 or C-531 is 6600 ohms. Loop resistance is defined by ohms law ($R = V/I$), and is measured at the console DC line terminals at the highest current to be used and with the adapter at the base station connected to the line, thus including the adapter voltage drop in the measurement.

When using a leased line, determine the resistance of the base-station adapter using $R = V/I$ at the highest current to be used. Subtract this adapter resistance from 6600 ohms and specify this number to the telephone company as the maximum line resistance. Also specify audio signal loss from the console to a 600-ohm load at the base station to be 20 dB or less if only 0 dBm line drive is permitted, and to be 30 dB or less if +10 dBm line drive is permitted, assuming that the base station and the console can drive the line to +10 dBm. (Multiple C-530 and C-531 consoles on a single line will not be able to drive a line at +10 dBm.) Sometimes leased metallic lines longer than 20 miles are not available.

When using a private two-wire DC line, first determine the base-station-adapter resistance using $R = V/I$ at the highest current to be used and subtract this from 6600 ohms. This figure is the maximum resistance of the DC line. Select a wire gauge for the line (such as 24 gauge), obtain the 1000-ft 20°C resistance from wire tables for the gauge (25.67 ohms), and multiply by 2 because two wires are involved (51.34 ohms). Divide the maximum line resistance by this figure and obtain the maximum length in thousands of feet. Example: Adapter resistance is 1600 ohms (24 V at 15 mA), leaving 5000 ohms for line resistance. 5000 ohms divided by 51.34 equals 97.4 thousand feet for 24-gauge wire (18.4 miles).

Unfortunately, standard high-capacitance 24-gauge twisted-pair cable 18.4 miles long would result in about 42 dB of audio signal attenuation, which is unacceptable even with +14 dBm line drive. 19-gauge high-capacitance twisted-pair cable would have to be used for up to 16 miles at 0 dBm line drive and for up to 24 miles with +10 dBm line drive. Signal attenuation is therefore the line-length limiting factor when high-capacitance twisted-pair cable is used, because the maximum loop resistance of 19-gauge cable is not reached until about 58 miles.

The C-531 may be solder-bridged for separate audio and DC lines, allowing for a low-audio-signal-loss line with relatively high DC resistance and a DC line where larger wire size can be selected for almost any length of line. The separate DC line can also be used in conjunction with a microwave link for the audio signal.

The least expensive method for very long distances is the old-fashioned open-wire line. Using a pair of 12-gauge 40% copperclad steel conductors spaced 12 inches apart (1000 ohms impedance) for both audio signals and DC control will allow the line to be 87 miles in length at 0 dBm line drive. This distance could be further increased to 200 miles by using 6-gauge 40% copperclad steel (650 ohms impedance).

Open-wire line (0.109-in diameter #135 steel wire) can also be used for up to 45 miles with 0 dBm line drive and up to 77 miles with +10 dBm line drive.

Multiple consoles on the DC line will decrease maximum line drive due to increased losses. 0 dBm line drive can still be obtained with up to eight consoles on a line. Receive losses are also increased from 3.5 dB

for three consoles to 12 dB for eight consoles, thus requiring 3.5 to 12 dB less audio signal line loss or higher line drive from the base station.

Grounding

The metal base of the console is connected to earth ground through the green wire of the power cord for shock-hazard reasons. Solder bridge JP9 and the E3, E4 capacitor provisions on the C-530 and solder bridge JP10 on the C-531 allow connection of circuit ground to earth ground. This is useful in some installations to reduce hum.

Cable

Generally, 24-gauge twisted-pair, 300-V, PVC-jacketed, high-capacitance cable is recommended for interior and other short-line-length usage. Cable splices should be made condensation-proof and weatherproof to prevent DC current leakage.

Theory of Operation (C-530)

Referring to the schematic, line audio signals are applied to the compressor (actually an automatic level control or ALC stage) through T1, R9, U3-3,4, and C9. Above the threshold of compression, a constant amplitude is maintained at U2-7 by input-signal rectification and gain control by this rectified and filtered signal. The value of R1 determines the maximum gain of the stage. The TX gates U3-2,1 and U3-10,11 are off during receive.

The ALC output is applied to the speaker through C10, U3-8,9, R11, C12, R101, U1-3,5, C8, and the hookswitch contacts at J2 and J3.

When the PTT or intercom switch is operated, U5-11 and U2-11 go high, enabling the TX gates U3-10,11 and U3-2,1. U2-10 goes low and disables the RX gates U3-3,4 and U3-8,9. Handset microphone audio signals are applied to the line through R4, C11, R10, U3-10,11, C9, C2, RN1-2,1, U2-6,7, C10, U3-2,1, R6, U4-3,1, R16 and R17, and T1. U4-7 also applies an out-of-phase audio signal to transformer T1, boosting primary audio current by 6 dB.

PTT switch operation, in addition to switching to TX, pulls U5-1,2 low through JP3. U5-3 goes high and generates a precise voltage at U6-5. This precise voltage is maintained at U6-6 by the high gain of the opamp and therefore maintains a precise current through R20. The current through R20 is also the emitter current of Q1 and, subtracting about 2% for base current, is also the collector current of Q1.

Using conventional positive-to-negative current flow, current from the high-voltage supply at C21 flows through relay contacts and one-half of transformer T1 to TB1-2, through the DC line, through the DC adapter at the base station, back through the other conductor of the DC line, through the other half winding of T1, through the other relay contacts, through CR1, through Q1 and R20 to the high-voltage power-supply common.

When the monitor switch is pressed, relay K1 is energized through U6-2,1 and U8-7,10, which reverses the direction of current flow through the DC line. In addition, U5-9 is pulled low through JP5. This causes a voltage to be developed at U6-5 corresponding to 2.5 mA of line current. Upon release of the monitor switch, the voltage at U6-5 falls to zero volts with corresponding near-zero (a few microamperes will flow due to leakage) line current.

Theory of Operation (C-531)

Audio Circuits

Referring to the schematic, line audio signals are applied to the compressor (actually an automatic level control or ALC stage) through T1, R13, U4-11,10, and C13. Above the threshold of compression, a constant amplitude is maintained at U2-7 by input signal rectification and gain control by this rectified and filtered signal. The value of R4 determines the maximum gain of the stage, C9 is the rectifier filter capacitor, R37 sets the DC output level, and RN1-7,8,4,3 plus C11 provides a low-DC-resistance, high-AC-impedance feedback path. The TX gates U4-3,4 and U4-8,9 are off during receive. The ALC stage output is applied to the speaker through C16, U4-2,1, R3, C3, R101, U1-3,5, C2, and the hookswitch contacts at J3 and J2.

When the PTT or intercom switch is operated, U3-11 and U2-11 go high, enabling the TX gates U4-3,4 and U4-8,9. U2-10 goes low and disables the RX gates U4-1,2 and U4-10,11. Handset microphone audio signals are applied to the line through R8, C17, R12, U4-8,9, C13, C7, RN1-2,1, U2-6,7, C16, U4-3,4, R11, U7-3,1, R14 and R15, and T1. U7-7 also applies an outphased audio signal to T1, boosting primary audio current by 6 dB.

DC-Line-Current Circuits

PTT switch operation, in addition to switching the audio circuits to TX, enables either the TX F1 output at U5-10 or the TX F2 output at U5-11, depending upon the F1/F2 switch position. This path is from the PTT switch through R7, U3-13,11, U3-8,10, and U3-6,5,4 to U5-12 and U5-8. The MON F2 output at U5-3 and the MON F1 output at U5-4 are enabled at U5-2,5 by the monitor switch through U9-10,11 and U3-1,2,3. The RX F2 output at U9-2 is disabled by TX at U9-13 through U2-11,10. Assuming the F1/F2 switch to be in the F1 position, the TX F1 programming column is high and all other columns are low. The RX F2 output at U9-2 is also disabled by MON or I/C switch operation through CR7 or CR8.

Assuming that the TX F1 jumper plug is in the +9/15-mA position (top of the TX F1 programming column), U9-5 is pulled high, which effectively connects U8-5 to the 9/15-mA jumper plug. Assuming that the 9/15-mA jumper plug is in the 15-mA position as shown, PTT switch operation causes 4.4 volts from the R24, R21, etc. voltage divider to be applied to U8-5. Feedback from the opamp output at U8-7 through the

base-emitter junction of Q1 maintains 4.4 volts across the 274-ohm resistor R27, which causes 16 mA of emitter current to flow from Q1. After subtracting base current from Q1 emitter current, about 15.4 mA will flow through the collector of Q1 from one side of the DC line at TB1-1 through half of the secondary winding of T1, JP6, and CR1.

Q2 is forward-biased to saturation by the approximately 5.1 V_{dc} at U8-7 through R29. Q2 collector current forward-biases Q6 to saturation through R33 and effectively connects the positive high voltage at TP7 to the other side of the DC line at TB1-4 through Q6, CR3, JP8, and one-half of the secondary of T1.

The 15.4-mA line current is maintained regardless of line resistance (loop resistance) by the constant voltage across R27. The collector voltage of Q1 will vary to maintain the desired current up to the point of Q1 saturation caused by a combination of loop resistance and applied high voltage.

When a negative current is programmed, U8-3 receives a voltage from the voltage divider, causing Q4 to sink a current from the line at TB1-4. Q3 and Q5 are forward-biased in the same manner as with "positive" current programming and the positive high voltage from TP7 flows through Q5, CR2, JP6, and one-half of the T1 secondary to TB-1.

Intercom switch operation (the PTT switch is not pressed) also causes the audio circuits to switch to TX through U3-12,11, but TX F1 and TX F2 outputs at U5-10,11 are disabled by a low at U5-8,12 from the I/C switch through U3-9,10 and U3-6,5,4.

Monitor-switch operation (or going off hook when JP5 is closed) applies a low to U9-10 which causes U9-11 and U3-1,2 to go low and U5-2,5 to go high. Depending upon the F1/F2 switch position, either U5-3 (MON F2) or U5-4 (MON F1) will go high and activate a monitor programming column.

The RX F2 programming column is activated by the combination of a high at U9-13 from an RX high at U2-10 and a high at U9-1 from a high at the F1 pole of the F1/F2 switch. (The F1/F2 switch is in the F2 position.)

Technical Assistance

Vega products are engineered to meet your requirements of performance, reliability, and compatibility. Technical assistance is offered by correspondence or telephone, should it be required, to assure your satisfaction.

Warranty

Vega signaling products are guaranteed to be free from defects in material and workmanship for a period of three years from the date of shipment. Warranty is for factory repair or replacement only.

Models C-530 and C-531 Specifications

Line Input and Output Impedance: 600 ohms nominal or 1200 ohms nominal, solder-bridge selectable, transformer isolated

Line Audio Input Level: -20 dBm to +14 dBm

Line Audio Output Level: -25 dBm to +14 dBm (with reference to noncompressed peak-to-peak measurements) into a 600-ohm line; to +6 dBm in a three-console system; to 0 dBm in an eight-console system

Lines: C-530, two-wire; C-531, two-wire or four-wire

Audio Compression (Receive and Transmit): Less than 3 dB change in output for 20 dB change in input above threshold

Distortion: 2% maximum at 20 dB compression

Hum and Noise: 50 dB below operating levels, minimum

Speaker: 4 in, 8 ohms; heavy-duty, high-efficiency on C-531, which doubles the acoustic power output (3 dB)

Amplifier Power: 800 mW into 8 ohms at 10% THD

Handset Earpiece Level: Volume-control adjustable

Sidetone Level: About 25 dB below receive level

Audio Frequency Response: ± 1.5 dB, 300 to 3000 Hz

DC Line Control Voltage: C-530, 125 V_{dc}; C-531, 85 or 125 V_{dc}, selectable

Operating Temperature Range: 0 to +50°C

Power Requirements: 117 V_{ac}, 60 Hz; 10 W, maximum

DC Line Control Current

C-530

TX: +6 or +15 mA (solder-jumper selectable)

RX: 0 mA

MON: -2.5 or -6 mA (solder-jumper selectable)

C-531

RX F1: 0 mA

TX F1, TX F2, RX F2, MON F1, MON

F2: -2.5, +2.5, -6, +6, -9, +9, -15, or +15 mA (programmable plug jumpers), and also to 0 mA (off)

C-530/C-531 Parts List

Part No.	Description	C-530 Ckt Sym	C-531 Ckt Sym				
010-0568	C-530 DC-remote console	---	---	134-3052	750 kohm res., RN55D, 1%, 1/4 W	R18	
010-0569	C-531 DC-remote console	---	---	134-3057	2.87 kohm res., RN55D, 1%, 1/4 W		R24
				134-3058	383 ohm res., RN55D, 1%, 1/4 W		R19
				134-3059	665 ohm res., RN55D, 1%, 1/4 W		R21
				136-0002	4.7 ohm comp. res., 5%, 1/4 W	R3	R5
				136-0030	680 ohm comp. res., 5%, 1/4 W	R5	R6
						R8	
				136-0032	1 kohm comp. res., 5%, 1/4 W		R1
				136-0040	4.7 kohm comp. res., 5%, 1/4 W		R4
011-0063	C-530 top assembly	---	---	136-0044	10 kohm comp. res., 5%, 1/4 W	R10	R12
011-0065	C-531 top assembly	---	---			R19	R29
							R30
012-0020	C-530 PCB assembly	---	---				R32
012-0021	C-531 PCB assembly	---	---				R34
012-0022	C-531 phone base subassembly	---	---				R38
012-0023	C-530 phone base subassembly	---	---	136-0052	47 kohm comp. res., 5%, 1/4 W	R2	R10
						R7	R37
024-0013	C-530 front panel	---	---	136-0054	68 kohm comp. res., 5%, 1/4 W		R31
024-0014	C-531 front panel	---	---				R33
				136-0056	100 kohm comp. res., 5%, 1/4 W		R7
065-0397	C-530 PCB	---	---				R26
065-0399	C-531 PCB	---	---				R28
				136-0060	220 kohm comp. res., 5%, 1/4 W		R36
102-0390	270 pF cer. cap., S2L, 5%, 50 V	C6	C1	136-0064	470 kohm comp. res., 5%, 1/4 W	R1	R4
		C22	C12	136-0270	1.1 kohm comp. res., 5%, 1/4 W		R23
				136-0287	130 kohm comp. res., 5%, 1/4 W		R35
105-1102	0.0047 μ F mylar cap., 10%, 100 V		C4	136-1761	13 kohm comp. res., 5%, 1/4 W	R11	R3
			C14	136-1956	300 kohm comp. res., 5%, 1/4 W		R9
105-1121	2.2 μ F mylar cap., 10%, 250 V	C18	C24				
105-1122	0.1 μ F mylar cap., 10%, 250 V		C26	138-0013	4 x 22 kohm SIP iso RNET	RN1	RN1
				138-0014	4 x 10 kohm SIP iso RNET	RN2	RN3
110-1271	0.005 μ F cer. cap., 1.4 kV		C25	138-0052	5 x 4.7 kohm SIP iso RNET	RN3	
110-1340	0.1 μ F cer. cap., small	C1	C5	138-0053	5 x 100 kohm SIP cmn RNET	RN4	
		C2	C6	138-0054	6 x 4.7 kohm SIP cmn RNET		RN2
		C7	C7	138-0058	6 x 22 kohm SIP cmn RNET		RN4
		C13	C15				
			C18	149-0618	MPSW10 NPN xstr, 300 V		Q2
			C22				Q3
110-1454	0.01 μ F disc cer. cap., 500 V	C19		149-0619	MPSW92 PNP xstr, 300 V		Q5
		C20					Q6
112-1606	10 μ F elec. cap., 25 V	C5	C11	149-0620	MJE340 NPN xstr, 300 V	Q1	Q1
		C16	C20				Q4
112-1608	1.0 μ F elec. cap., 20%, 25 V	C3	C3	161-0366	1N4003 diode	CR1	CR1
		C4	C9			CR2	CR2
		C9	C10				CR3
		C10	C13				CR4
112-1609	100 μ F elec. cap., 20%, 25 V	C12	C16	161-0426	1N4148 diode		CR7
		C8	C2				CR8
		C15	C19				CR9
112-1678	1.0 μ F elec. cap., 50 V, NP	C11	C17				CR10
112-1684	1000 μ F elec. cap., 25 V, RAD	C17	C21				CR11
112-1704	100 μ F elec. cap., 160 V	C21	C23				CR12
							CR13
130-0633	1 kohm var. res., hor. mt.	R4	R8	161-0573	Red LED diode, T1, 3/4, DIF	CR101	CR101
130-0724	10 kohm var. res., log, v-adj.	R6	R11				
		R9	R13	163-0002	Diode bridge, 200 V, 1 A	CR3	CR5
130-0745	10 kohm var. res., log, PNL	R101	R101			CR4	CR6
134-0195	100 kohm res., RN55D, 1%, 1/4 W	R15		180-0321	DPDT relay, PCB, 12 V	K1	
134-2886	332 ohm res., RN55D, 1%, 1/4 W		R18				
134-3036	274 ohm res., RN55D, 1%, 1/4 W	R16	R14	249-0119	8-ohm speaker, 4 in sq., 3 W		---
		R17	R15				

249-0121	Handset, electret, PTT switch	—	—	326-0006	Power xfmr	T2	T2
249-0136	8-ohm speaker, 4 in sq., 1 W	—	—				
249-0138	Handset, carbon, PTT switch	—	—	425-0104	4016 quad sw CMOS IC	U3	
				425-0106	7812C reg-P IC, 12 V, 1.5 A	U7	U11
261-0214	1/2 A fuse, 3AG	F1	F1	425-0171	4081 quad 2AND CMOS IC		U5
261-0299	Fuse clip, 3AG	—	—	425-0178	NE570N IC	U2	U2
261-0310	Fuse cover, flexible PVC	—	—	425-0202	5532 dual RL600 opamp IC	U4	U7
				425-0215	ULN2004A IC	U8	U6
286-1756	10-pin wafer term., wire-wrap	P1		425-0217	LM386 power amp IC, 1 W	U1	U1
286-1766	Jumper plug conn.		—	425-0230	LM358 dual opamp IC	U6	U8
286-1772	36-pin conn.		—	425-0255	4093 quad trig. CMOS IC	U5	U3
286-1830	Modular handset conn., PCB	J1	J1	425-0285	4066 quad sw CMOS IC		U4
286-1851	Dual recept., spade lug, PCB	J3	J2				U9
		J4	J3				U10
		J6	J4				
		J7	J5	460-0308	Rubber foot, brown	—	—
286-1858	13-pin IDC conn.		—				
286-1859	13-pin header conn.		P1	550-0269	Knob, black	—	—
286-1860	4-pin mini term. strip		TB1				
286-1863	2-pin term. strip, mini	TB1		674-0243	Power cord, 3-wire, 6 ft, black	—	—
296-0601	Switch, (ON)-OFF-(ON)	S101	S102				
296-0602	Switch, ON-NONE-ON		S101	869-0024	Telephone case, beige	—	—
				869-0025	Phone base, reg.	—	—
				869-0026	Hook switch	—	—
318-0256	600-split-600 ohm xfmr	T1	T1				


Vega

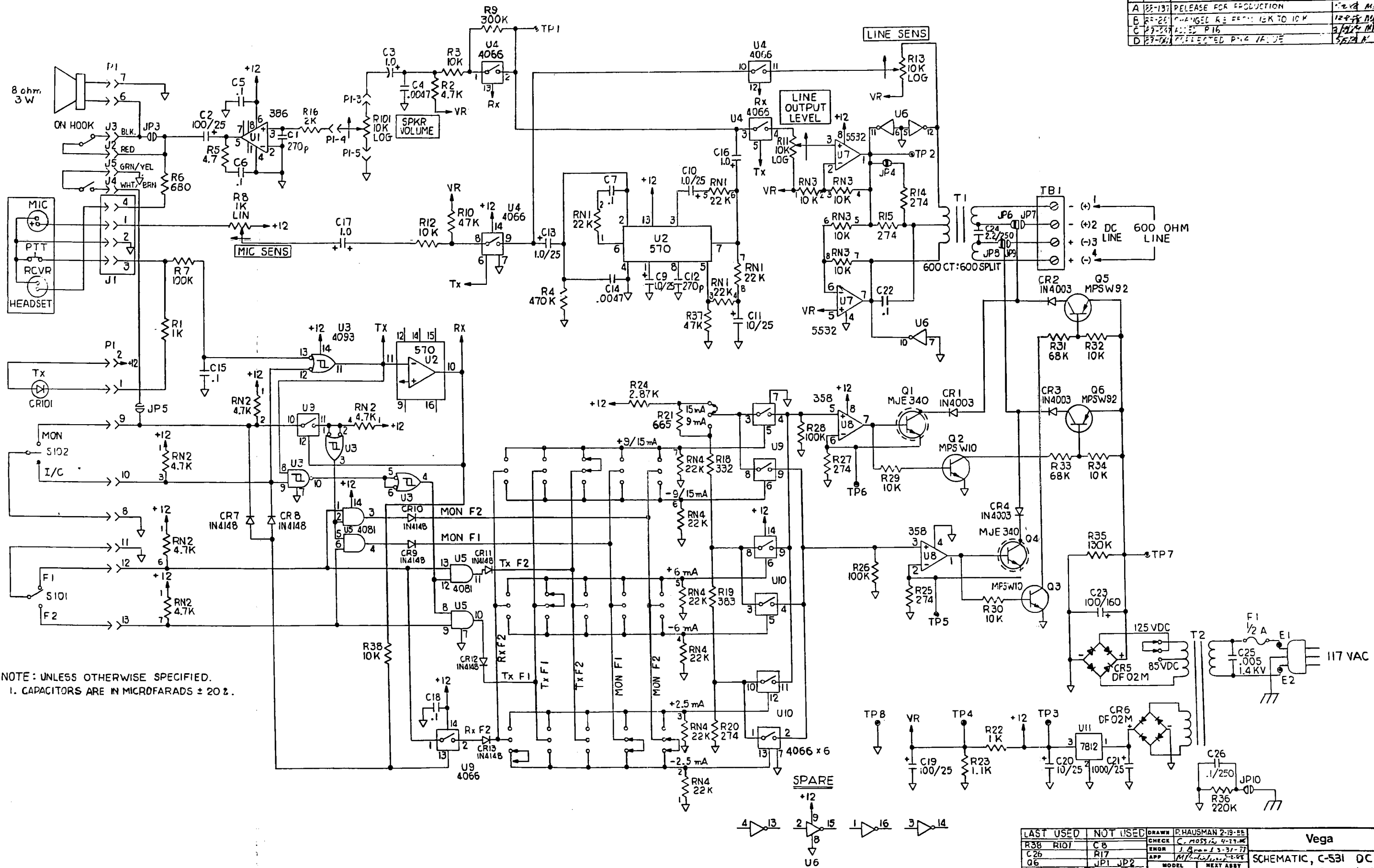
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REVISIONS			
REV	CHG. DW	DESCRIPTION	DATE APP
A	15-137	RELEASE FOR PRODUCTION	12-28 MK
B	25-26	CHANGED R3 FROM 10K TO 10K	12-28 MK
C	25-27	ADDED P16	3-10-68 MK
D	25-28	SELECTED P14 1A. JE	5-22-68 MK



NOTE: UNLESS OTHERWISE SPECIFIED.
1. CAPACITORS ARE IN MICROFARADS ± 20 %.

ASSY. 011-0065
P.C.B. 065-0393

LAST USED		NOT USED		DRAWN		CHECK		DATE	
R38	RI01	C8		HAUSMAN	2-19-68	C. MOSS	4-21-68		
C26		R17		ENGR	1-8-68	1-3-31-77			
Q6		JP1	JP2	APP	M/L	1-3-31-77			
RN4				MODEL					
U10				C-531	011-0065				
JP10									
TB 5									

Vega

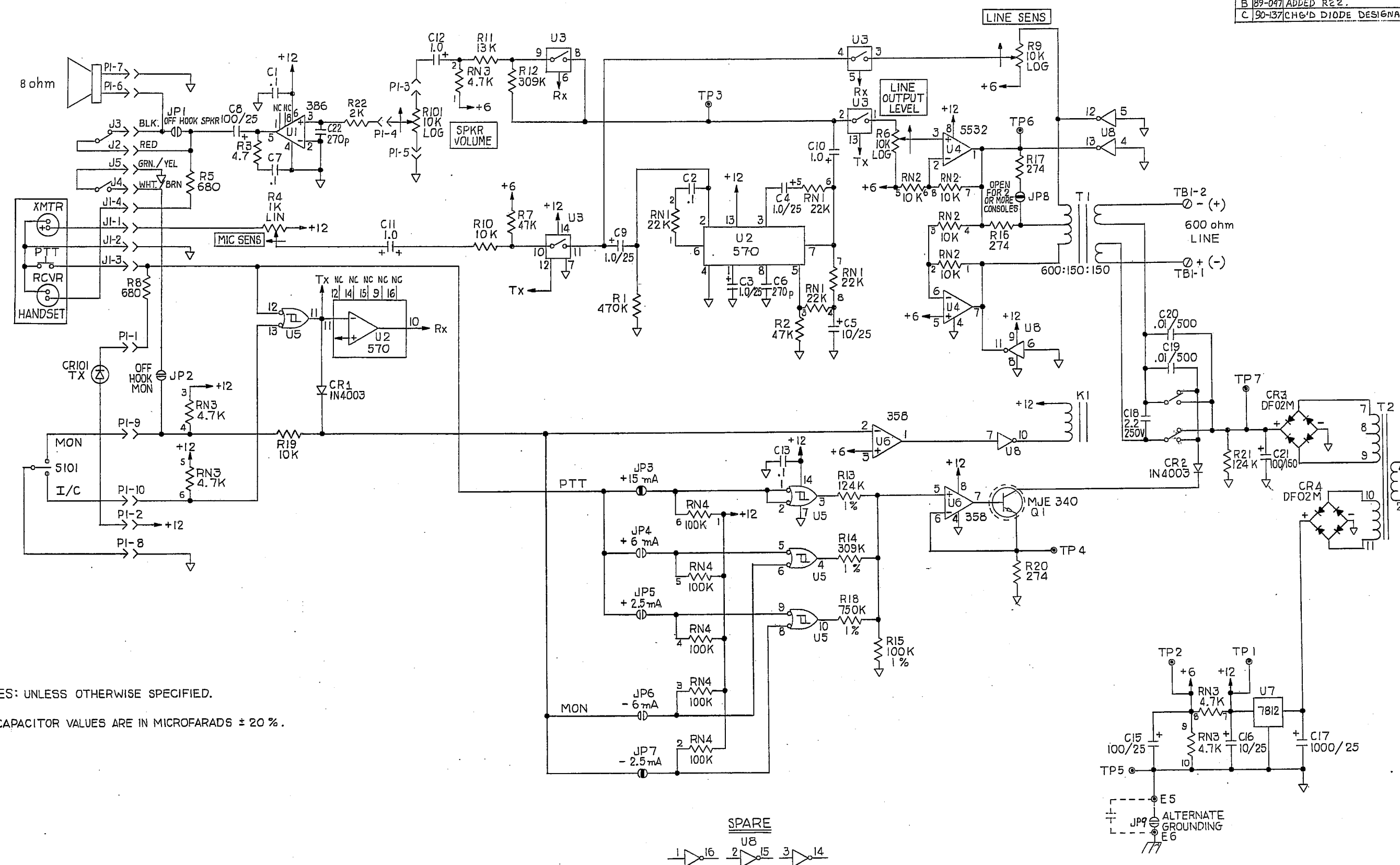
SCHEMATIC, C-531 DC
REMOTE CONTROL CONSOLE

D 071-0517

SCALE 1/8" = 1"

SHEET 1

REVISIONS			
REV	CHG. ON	DESCRIPTION	DATE
A	88-100	RELEASE FOR PRODUCTION	3-31-88
B	89-047	ADDED R22.	7/1/89
C	90-137	CHG'D DIODE DESIGNATORS	1/1/90



NOTES: UNLESS OTHERWISE SPECIFIED.
 1. CAPACITOR VALUES ARE IN MICROFARADS $\pm 20\%$.

ASSY 011-0063
 PCB 065-0397

LAST USED	NOT USED	DRAWN	PHASMAN 2-18-88
C22	C14	CHECK	
R22		ENGR	J. Brand 3-31-88
U8		APP	W. H. H. 3-31-88
Q1		MODEL	W. H. H. 3-31-88
RN 4		W. H. H. 3-31-88	
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Vega			
SCHEMATIC, C-530 DC REMOTE CONTROL CONSOLE			
D 071-0516			
SCALE			
SHEET 1 OF 1			