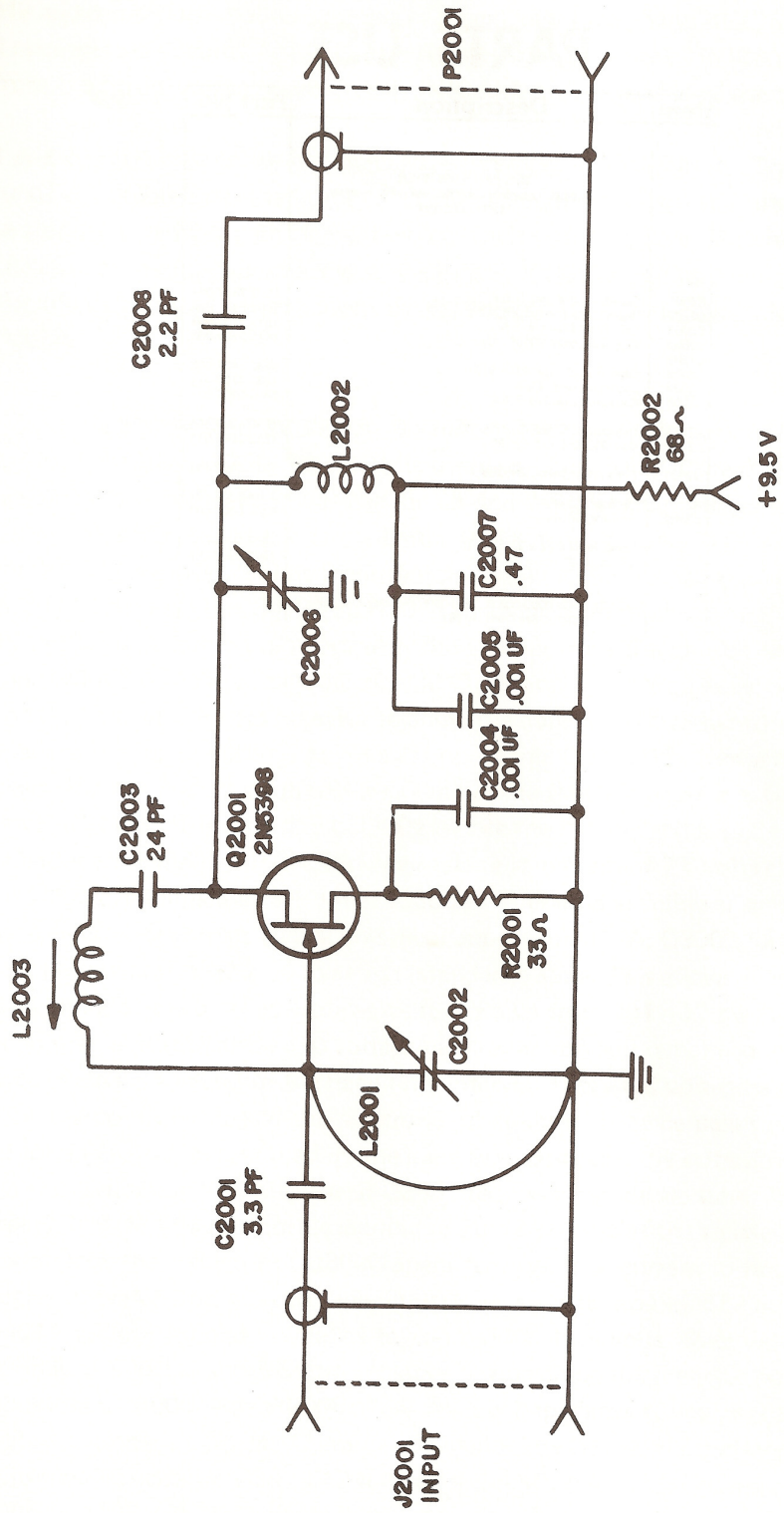


R.F. PRE AMP MODULE PARTS LOCATION



R.F. PRE AMP SCHEMATIC

PARTS LIST

Item	Descriptio	Part No
	R.F. PRE-AMPLIFIER	
	To order aomplete parts list, u. order number	
	1939-1088-101	
C2001	Capacitor, disc. cer. 3.3pf.	1501-3301-001
C2202	Capacitor, air. var. 1.3-S.4pf	1562-5401-002
C2003	Capacitor, 27pf s.m. ± 5%	1513-2702-005
C2004	Capacitor, chip .001uf. 50V	1513-2702-006
C2005		
C2006	Capacitor, air. var. 1.3-5.4pf	1562-5401-1102
C2007	Capacitor, tent 4 Jut	1532-4706-015
C2009	Capacitor, disc. cer. 2.2pf	1501-2201-001
L2001	Inductor, %T, .55" OI • No. 20	1810-1082-014
L2002	Coil. 2T • 156 I.D. No. 20	1810-1082-015
02001	Field effect trans., 2N5398	4811-0802-441
R2001	Resistor, 33 ohm	4704-3302-001
R2002	Resistor, 68 ohm	4704-6802-001
	Slug. brass 6-32 x 3/16. SLT	2508-0000.Q05
	"Form, coil	1860-0000-001
	NOTE: 2608-0000-005 or. 1860.0000-001 make up coil	
	L2003. See DWG. A-181	

REPEAT AUDIO INTERFACE MODULE

The 1043 audio interface module consists of a high pass filter, hang AGC, squelch muting and microphone circuits. The high pass filter is used to remove UN ICALL (CTCSS) audio from the carrier so that regenerated UN ICALL may be added at the transmitter.

IC3001 A/B is a five pole active high pass filter with a cutoff of 300 Hz. The components are of closer tolerance than those normally used to insure a sharp cutoff. IC3002 is an electronically variable gain element which has low distortion even at high attenuation. It is also used as the repeat audio squelch gate. IC3003A is a variable gain buffer. R3012 should be adjusted for an output of .5V Peak-to-Peak or less at J13A, the output of IC05A.

The output of IC3003A feeds IC3005A, the output microphone/repeat audio summing amplifier, and also feeds IC3003B which is a pre-emphasized AGC peak detector.

The pre-emphasis is intended to better match the AGC characteristics to the pre-emphasized peak clipper in the modulator. It also tends to track AGC to voice peaks rather than averages. Pulses from the output of IC3003B drives C3013 and C3011/C3012 (in parallel). C3013 and R3024 together form the hang time constant. IC3004B is used as a comparator between the voltage from the divider formed by R3025 and R3026 and the voltage across C3013. When C3012 charges sufficiently, the output of the comparator goes negative to allow the collector of 03002 to go to the high impedance state. The charge pump can now charge C3011/12. This action occurs at the beginning of a transmission and also at any time that voice peaks exceed the established AGC level. CR3003 and CR3002 isolate the two capacitor systems. The voltage divider associated with CR3001 maintains a minimum of 2.5 volts charge on the C3011/12 to minimize attack time. IC3004A is a voltage follower and switch. When squelch control voltage (signal presence) appears on J 11 A. 03003 turns on thus switching the collector of 03004 to a high impedance state. This allows IC3004A to work as a voltage follower. Very little current is drawn from 3011/12 by the voltage follower so that an established AGC voltage/gain reduction will remain constant until a discharge occurs at the end of the hang time interval. This AGC voltage is applied directly to the control input of the electronic attenuator. If voice peaks are not detected for an interval determined by the hang time constant, the output of IC3004B goes high thus switching the collector of 03002 to a low impedance state. This action discharges C3011/12 at a rate corresponding to 20 dB/second. If the squelch control voltage goes low, the collector of 03003 opens to allow base current to flow to 03004, the collector of which now goes to a low impedance state to ground. The output of the IC3004A voltage follower switches to approximately a volts which increases attenuation in IC3002 to about 80dB, effectively squelching the repeated audio. Note also that diodes CR3004 and C R3005 allow the low impedance collector to discharge C3113, the hang time capacitor. Therefore the hang time is reset for each transmission. This additionally discharges C3011/12 to reset the AGC. If a voltage appears at the input J05A, 03005 squelches the repeat audio regardless of signal conditions. This repeat defeat may be activated by the pull switch on the squelch control if so equipped

(otherwise used to defeat the noise blanker) or from a terminal on the rear apron of the receiver. When remote control is installed, this terminal is wired to the remote control and noise blanker shut down in independent. IC3005A/B is the local mike buffer and mixer. The local mike level is adjusted by R3041 which is completely independent of all repeater audio adjustments.

COR (CARRIER OPERATED RELAY) / TIME-OUT TIMER

The 1043 COR module uses receiver squelch control voltage to provide automatic PTT for the transmitter, strappable drop-out timing and strappable time-out timing. There is also a defeat input.

Q1 and Q2 are connected as a 250 msec astable multivibrator. Bipolar transistor multivibrators provide more consistent timing than CMOS versions. The slow rise time of this circuit is improved by the Schmidt trigger formed by IC1A/B and applied to the clock input of IC3 which is a 7 stage CMOS ripple counter. Q3 forms a clamp on the multivibrator clock. Drop out input J 1 is plugged onto anyone of the pins connected to the outputs of IC3. When this input comes up, the output of IC1 E inverter goes down. Squelch control voltage is applied to pin 11A. The Schmidt trigger formed by IC1 C/D improves the rise and fall time. If the squelch voltage is up, pin 5 of IC2A is up, thus forcing the output of this NOR gate down. This in turn forces the output of IC2B NOR up and the collector of Q4 down which opens the Q3 clamp. Q5 is also open and R23 biases on Q6, the PTT switch. The clock thus continues to run even though the drop out input, J1 continues to periodically rise and fall. When the squelch control voltage falls to the low state, pin 13 of IC2C goes low. If time-out has not occurred, pin 12 is also low so this forces the output of this NOR up. C1, R3 and CR1 form a positive edge discriminator functioning on the fall of squelch control voltage. This triggers the single shot formed by IC2D and IC1 F which provides a reset pulse for the IC3 counter. Gate IC2A is now also opened. IC3 begins from count zero and continues until the output connected to J1 is toggled up forcing the output of IC1 E down. Since both inputs of the following NOR are down, the output goes high forcing the output of IC2B down. The collector of Q4 goes high and this in turn activates the Q3 clamp and stops the clock. Thus the high output of IC3 is maintained and the system counts no further. A high state on Q4 also biases Q5 to saturation and opens Q6, the PTT switch. This is the operation of the drop-out timer.

The time-out timer uses the same clock and much of the same gating and counting circuitry. A positive going squelch control voltage at J 11 A (signal presence) creates a fast rising edge at the output of IC1C/D. C4,R5 and CR2 form a positive edge discriminator which connects to the same IC2D/IC1 F single shot. IC3 is again reset. This reset line also connects to the reset input of IC4 which is a decoded decade counter operating from the output of IC3, the seven stage ripple counter. Thus the clock to IC4 is 2^7 or 128 times slower than the clock to IC3. Positive edge clock pulses occur at the input to IC4 approximately every 18 seconds. As previously described the counter is operating when squelch control voltage is up and time-out has not

occurred. The PTT switch is also closed. J2 is strapped to one of the outputs from IC4. When this output goes high, pin 2 of IC2B goes high forcing the output low, the collector of 04 high and thus the clock clamp on and PTT switch off. Since the clock stops, the time-out condition remains until reset. J2 is also connected to the input of IC2C which forces the output down under the time-out condition. This prevents a reset when the squelch control voltage goes low and prevents a "drop-out" transmission when the long carrier disappears. The time-out condition will be reset on the next transmission.

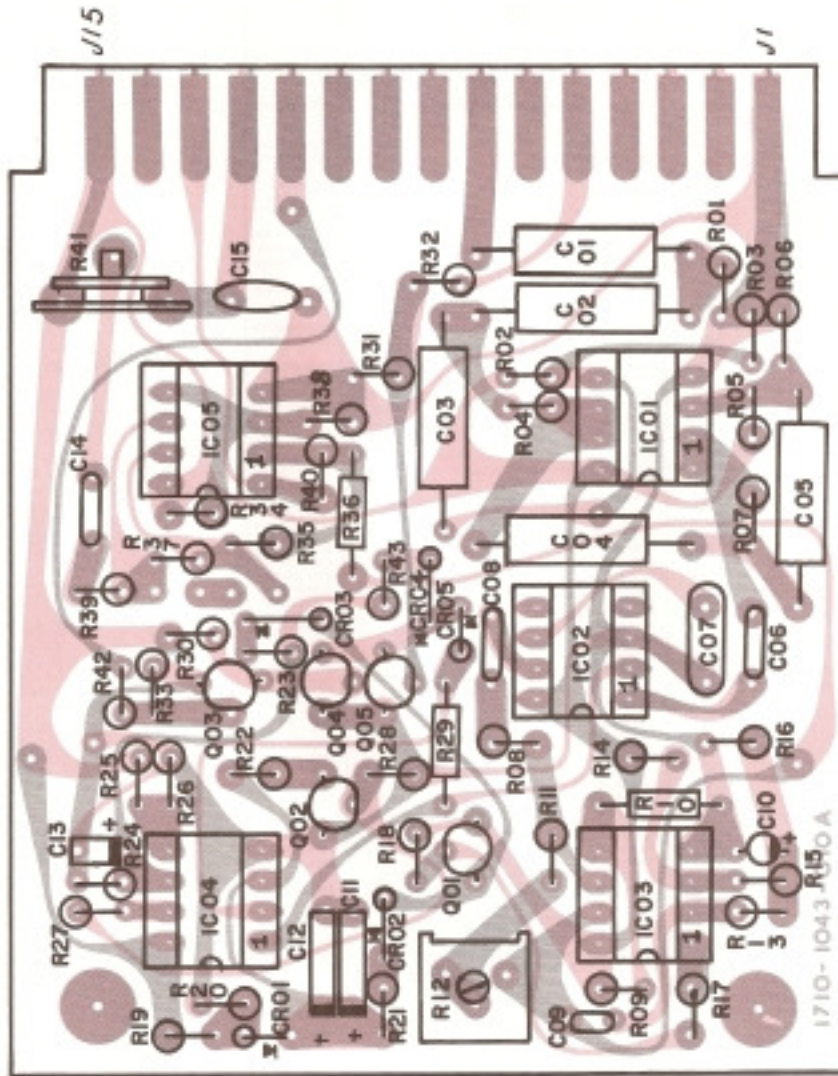
COR ADJUSTMENT PROCEDURE

To adjust the carrier operated relay, remove the PC board from the top PC edge card socket in the receiver. J1 & J2 are plugged onto the pins desired as described on the schematic diagram for the COR and the parts location (assembly) drawing. This board/module comes adjusted to the maximum drop-out/time-out available. These are the longest time periods permitted in the U.S. There are no other COR adjustments. Replace the board. This board may be removed any time an accidental keying of the transmitter would be injurious to equipment or personnel.

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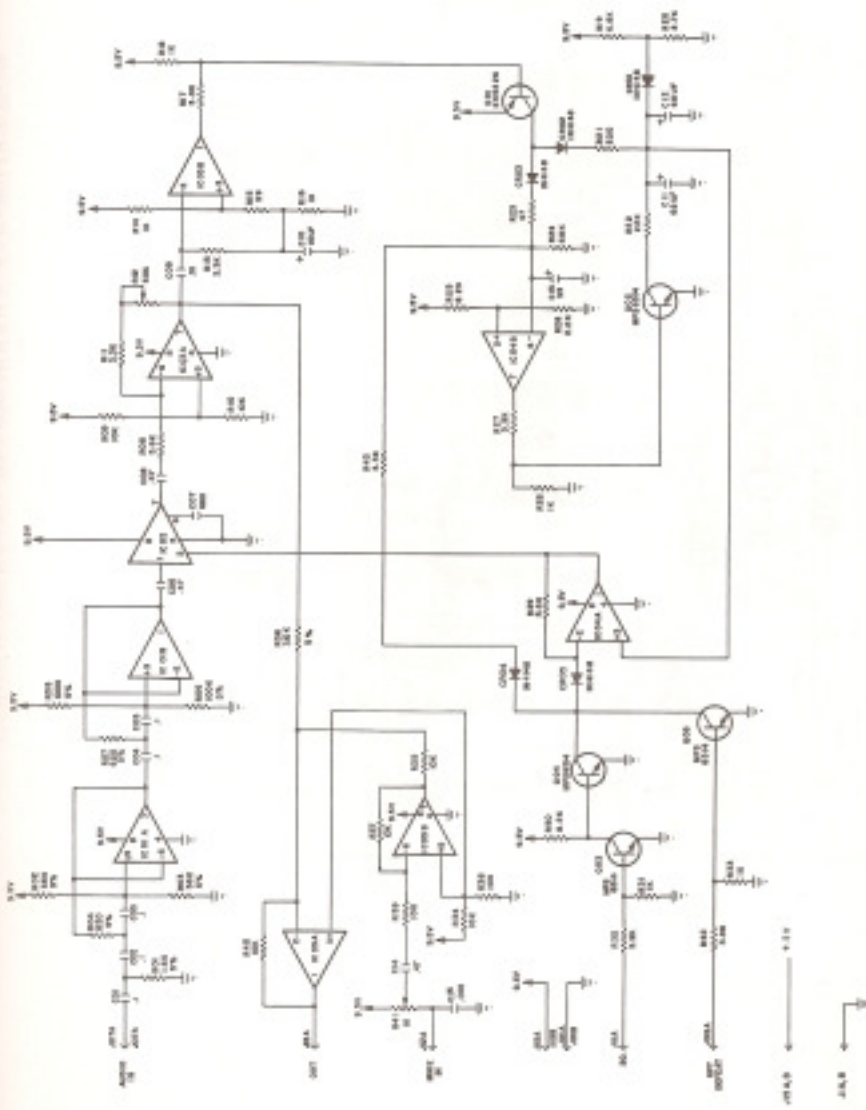
PARTS LIST

Item	Description	Part No
	B REPEAT AUDIO INTERFACE BOARD	
	To order complete board, use part number	
	1939- 1 043-1 02	
C01	Capacitor,.1 mfd metallized polycarbonate film	1537-1006-001
thru		
C05		
C06	Capacitor, .4 7	1526-4706-001
C07	Capacitor, 680 pf	1513-6803-001
C08	Capacitor, .47	1526-4706-001
C09	Capacitor, .01 uf	1526 1005-001
C10	Capacitor, 10 uf	1532-1008-015
C11	Capacitor, 68 uf	1532-6808-015
C12		
C13	Capacitor, 33 uf	1532-3308-010
C14	Capacitor, .47	1526-4706-001
C15	Capacitor, .001	1506-1004-001
D05	Zener Diode, 1N751A	4830-5001-001
D06		
R01	Resistor, 1.6K	4704-1604-002
R02	Resistor,36K	4704-3605-002
R03		
R04	Resistor, 820 ohm	4704-8203-002
R05	Resistor, WOK	4704-1006-002
R06		
R07	Resistor, 620 ohm	4704-6203-002
R08	Resistor,5.6K	4704-5604-001
R09	Resistor, 10K	4704-1005-001
R10		
R11	Resistor,3.3K	4704-3304-001
R12	Potentiometer 50K linear, Harz. mt.	4735-5005-005
R13	Resistor,3.3K	4704-3304-001
R14	Resistor,1K	4704-1004-001
R15	Resistor, 39 ohm	4704-3902-001
R16	Resistor,1K	4704-1004-001
R17	Resistor,3.9K	4704-3904-001
R18	Resistor,1K	4704-1004-001
R19	Resistor, 6.aK	4704-6804-001
R20	Resistor,2.7K	4704-2704-001
R21	Resistor, 220 ohm	4704-2203-001
R22	Resistor, 22K	4704-2205-001
R23	Resistor, 47 ohm	4704-4702-001
R24	Resistor,6SK	4704-6805-001
R25	Resistor,8.2K	4704-8204-001
R26	Resistor,2.2K	4704-2204-001
R27	Resistor,3.9K	4704-3904-001
R28	Resistor, 1 K	4704-1004-001
R29	Resistor,3.3K	4704-3304-001
R30	Resistor,8.2K	4704-3204-001
R31	Resistor, 1 K	4704-1004-001
R32	Resistor, 3.9K	4704-3904-001
R33	Resistor,1K	4704-1004-001
R34	Resistor. 10K	4704-1005-001
R35		
R36	Resistor,36K	4704-3605-002
R37	Resistor, 10K	4704-1005-001
thru		
R40		
R41	Potentiometer 1 K	4735-1004-002
R42	Resistor,3.9K	4704-3904-001
R43	Resistor,3.3K	4704-3304-001
CR01	Diode 1N4148	4803-0000-004
thru		
CR05		
IC1	Operational Amp MC1458CP	4850-0000-017
IC2	Electronic Attenuator, MC3340P	4850-0000-016
IC3	Operational Amp MC1458CP	4850-0000-017
thru		
IC5		

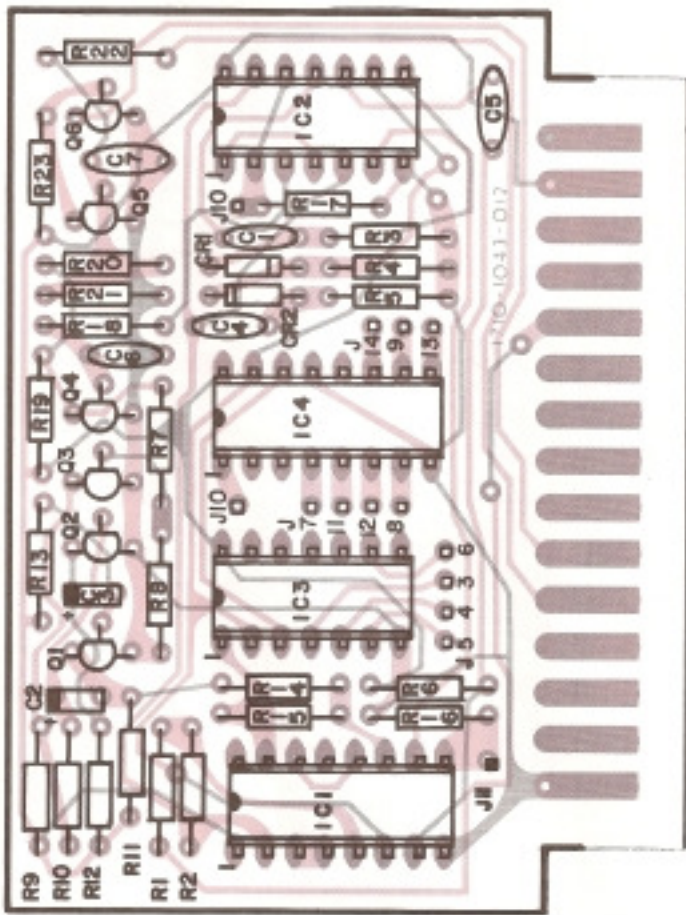


REPEAT AUDIO INTERFACE MODULE PARTS LOCATION

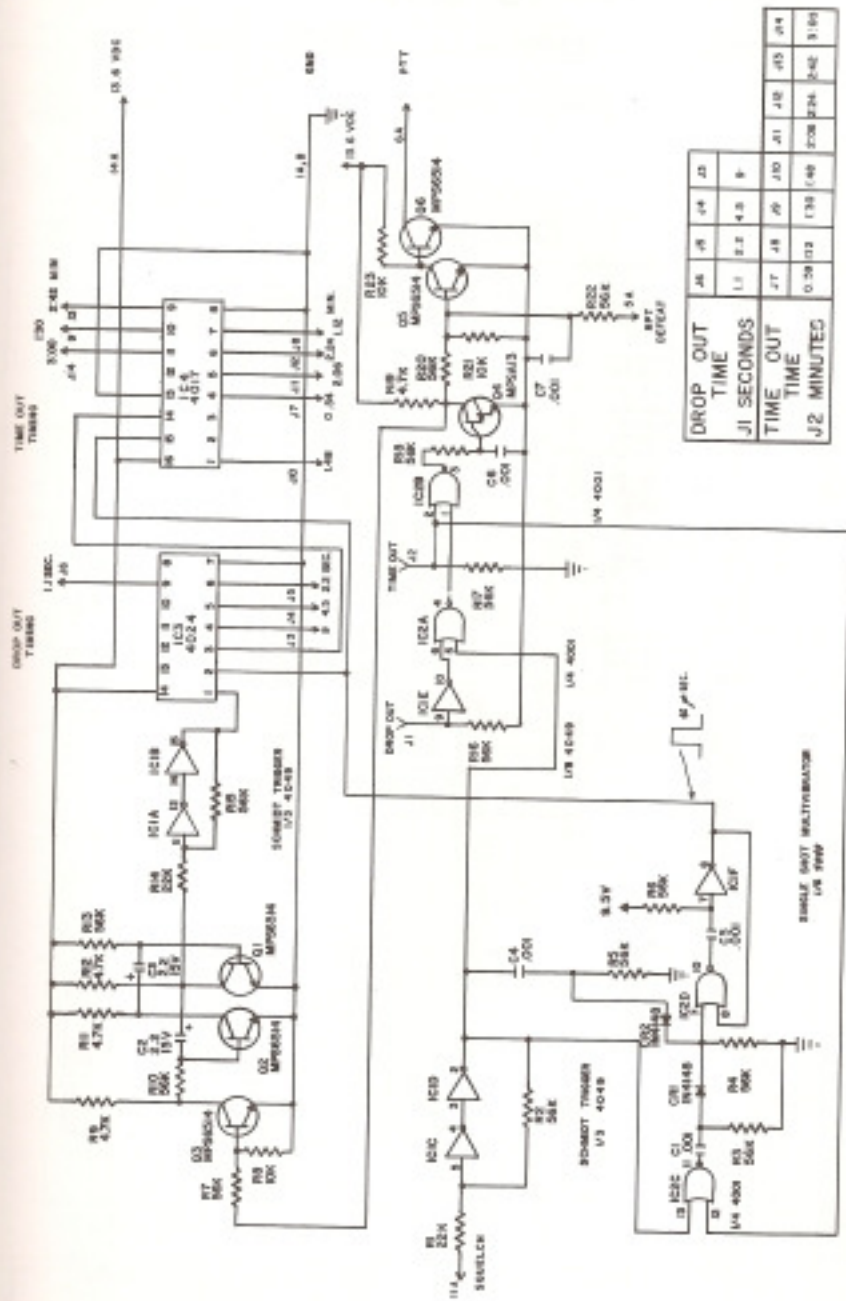
NOTE: ALL VALUES REFER TO STANDARD RESISTOR VALUES AND IN SINGLE-DIGIT VALUES, UNLESS OTHERWISE SPECIFIED. VALUES IN PARENTHESES ARE TYPICAL VALUES FOR RESISTORS. VALUES IN SQUARES ARE IN MILLI-OHMS. COMPLETE BREADBOARD CONNECTIONS FOR THIS CIRCUIT ARE AVAILABLE FROM THE AUTHOR. SEE THE AUTHOR'S WEBSITE AT: www.mikemcclellan.com



REPEAT AUDIO INTERFACE SCHEMATIC



CARRIER OPERATED RELAY MODULE PARTS LOCATION



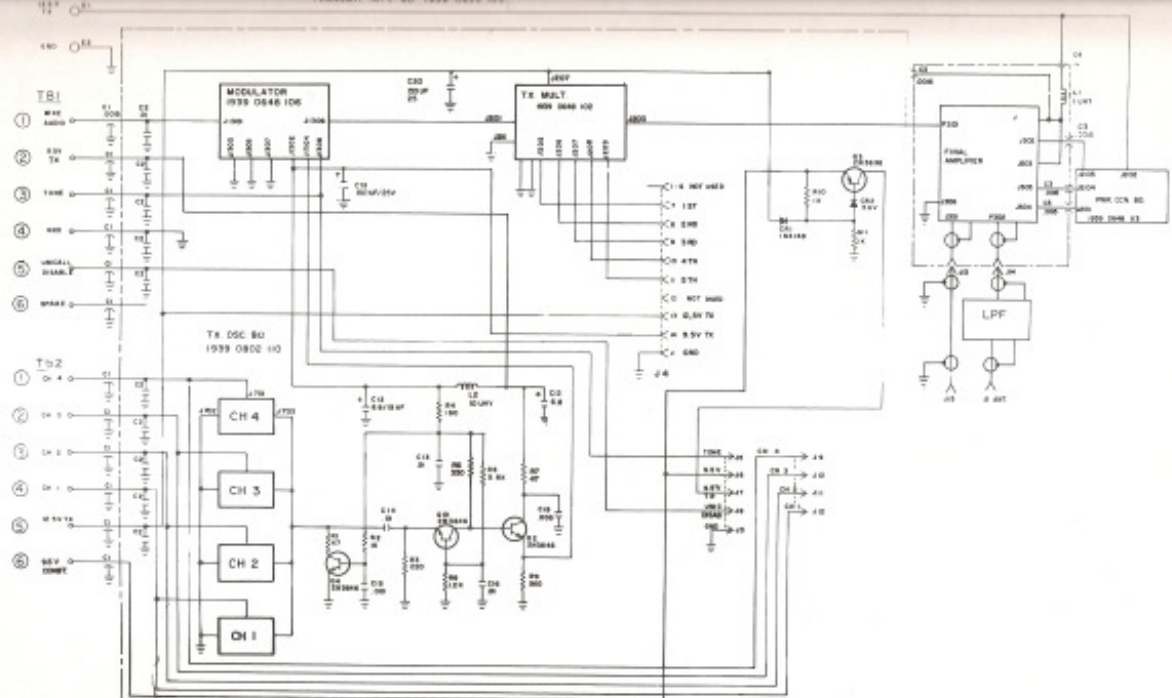
DROP OUT TIME	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14
TIME SECONDS	1.1	2.2	4.4	8.8	17.6	35.2	70.4	140.8	281.6	563.2	1126.4	2252.8	4505.6	9011.2
TIME MINUTES	0.018	0.036	0.072	0.144	0.288	0.576	1.152	2.304	4.608	9.216	18.432	36.864	73.728	147.456

CARRIER OPERATED RELAY SCHEMATIC

PARTS LIST

Item	Description	Part No
CARRIER OPERATED RELAY To order complete assembly, use part number 1839-1043-104		
C1	Capacitor, .001 pf	1506-1004-001
C2	Capacitor, 2.2 uf	1532-2207-015
C3		
C4	Capacitor, .001 pf	1506-1004-001
C5		
C6		
C7		
Q1	Transistor MPS6514	4811-0000-012
Q2		
Q3		
Q4	Transistor MPSA13	4813-0000-001
Q5	Transistor MPS6514	4811-0000-012
Q6		
R1	Resistor, 22K	4704-2205-001
R2	Resistor, 56K	4704-5605-001
R3		
R4		
R5	Resistor, 10K	4704-1005-001
R6	Resistor, 4.7K	4704-4704-001
R7	Resistor, 56K	4704-5604-001
R8	Resistor, 4.7K	4704-4704-001
R9		
R10	Resistor, 56K	4704-5605-001
R11	Resistor, 4.7K	4704-4704-001
R12		
R13	Resistor, 56K	4704-5605-001
R14	Resistor, 22K	4704-2205-001
R15	Resistor, 56K	4704-5605-001
R16		
R17		
R18		
R19		
R20	Resistor, 10K	4704-1005-001
R21	Resistor, 56K	4704-5605-001
R22	Resistor, 10K	4704-1005-001
R23		
CR1	Diode 1N4148	4803-0000-004
CR2		
IC1	IC CD4093AE	4851-4093-001
IC2	IC CD4001AE	4851-4001-001
IC3	IC CD4024AE	4851-4024-001
IC4	IC CD4017AE	4851-4017-001

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MASTER INTERCONNECT SCHEMATIC