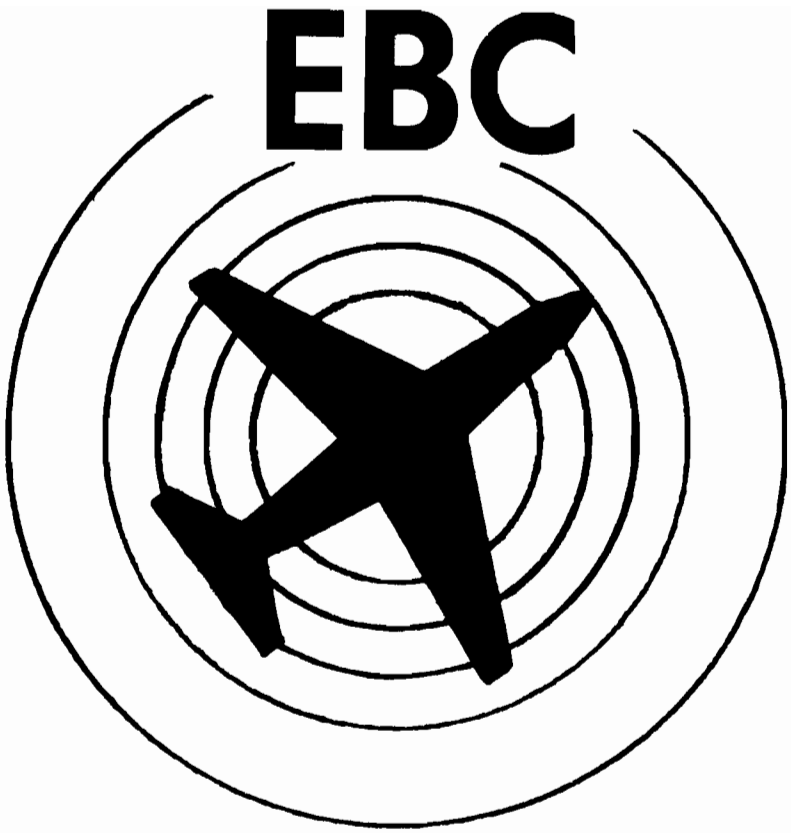


144 JR.

emergency beacon corp.

15 RIVER STREET, NEW ROCHELLE, N.Y. 10801

W A R R A N T Y

The equipment described herein is sold under the following warranty:

EMERGENCY BEACON CORPORATION (EBC) agrees to repair or replace, at EBC's option, without charge for a period of ninety (90) days from the date of delivery to the Buyer, any equipment, parts or accessories which are found to be defective as to design, workmanship or material, and which are returned to EBC at its factory, transportation prepaid, provided that:

a) The warranty card shall have been properly and completely filled out by the Buyer and returned to EBC within ten (10) days of the date of purchase; and,

b) Notice of the claimed defect is given to EBC in writing within ninety (90) days from the date of delivery to the Buyer and the equipment is returned to EBC in accordance with EBC's instructions.

c) Equipment, parts or accessories not manufactured by EBC or from EBC design, are subject to only such adjustment as EBC may obtain from the supplier thereof.

d) No item of equipment or accessory shall be deemed to be defective if, due to excessive exposure to the elements or abusive use after delivery, it shall fail to operate in a normal and proper manner; and

e) This warranty is void if equipment is altered or repaired by anyone other than EBC or its authorized service representative.

The foregoing is in lieu of any other warranty, expressed or implied, including without limitation, any warranty of merchantability, and shall constitute the Buyer's right and remedy hereunder. In no event shall EBC have any liability for consequential damages, or liability for loss, damage or expense directly or indirectly arising from the use of the equipment, or inability to use the equipment in combination with other equipment or materials or any other liability.

WARRANTY VOID IF SEAL ON RADIO IS BROKEN OR REMOVED

EBC-144 Jr. Manual

SECTION I

DESCRIPTION

The EBC-144 JR. is a high performance, "state of the art" digitally synthesized VHF transceiver, that when properly operated, will offer excellent communication functions. Every effort has been made during design to incorporate high quality, technologically advanced components in a convenient, compact format.

A frequency range of 143.5 MHz to 148.5 MHz is covered in 5 KHz increments by use of the front panel thumbwheel switches. There is provision made for automatic offsets when desired.

The ultra-sensitive receiver features a rated .35 uV sensitivity with excellent adjacent channel and spurious noise rejection. As with any digitally synthesized receiver with 1,000 possible input frequencies, there are some internal spurious responses. The design has limited these to less than 1 microvolt equivalent input signal strength. It is only because of the excellent sensitivity (typically .20 uV) that they are observable at all.

With an eye to the future, and to the existing situation in the New York Metropolitan Area, the EBC-144 JR. has been constructed for 15 KHz channel spacing and a modulation acceptance of ± 6 KHz which has been factory set so that modulation does not exceed ± 4.5 KHz. Therefore, if your area has a trend to operate transmitters with deviation levels of greater than ± 5 KHz, you may notice some deterioration of performance.

The frequency determining oscillator of this unit is a very sensitive circuit designed to accurately track to the desired programmed frequency. The extreme sensitivity makes it susceptible to slight changes in component values, such as can occur when the mechanical configuration of an inductor is disturbed. This can happen if the volume of the speaker is excessively loud. Effort has been made to mechanically decouple the speaker from the case. But the only way to completely avoid this problem is to use an external speaker, for which a jack is provided. As this oscillator is the frequency determining component, there is some transition time when changing from one frequency to another. This is the case when going from the receive mode to the transmit mode. Therefore, you may notice that the first syllable of your transmission is clipped, if it is your practice to begin talking at the instant you start transmitting. It is recommended that you make it a practice of pausing approximately 0.5 seconds to allow the phase locked loop to lock before speaking.

We at Emergency Beacon Corporation feel that you now own a superior piece of equipment and we hope that your EBC-144 JR. will bring you many hours of operating pleasure.

DESCRIPTION CON'T.

C A U T I O N

This transceiver uses state of the art solid state electronics and requires state of the art test equipment costing thousands of dollars to troubleshoot certain sections. It is a well engineered, reliable, quality product and should require little or no maintenance. Only the best quality products have been used in its construction. For this reason, LOOK BUT DO NOT TOUCH! There are very few adjustments, none of which will work magical wonders in getting another watt or dB of signal. The transceiver has been adjusted for optimum performance at the factory. Most repairs, if required, cannot be made without the need for sophisticated test equipment, AND THERE ARE NO ADJUSTMENTS that can be tweaked, diddled, or fiddled with unless test equipment is available. In case of difficulty, it would be best to consult the factory.

SECTION II

SPECIFICATIONS

GENERAL

FREQUENCY RANGE	143.5 - 148.5 MHz Receiver & Transmitter
MODULATION	16F3 NBFM, 5 KHz Deviation
R.F. POWER OUTPUT	20 Watts Minimum @13.6 Volts DC
FREQUENCY CONTROL	Digitally Synthesized 5 KHz Steps
FREQUENCY STABILITY	.001%
RECEIVER TYPE	Superheterodyne, Single Conversion
SUPPLY VOLTAGE	12 - 14.5 Volts DC, Negative Ground
SUPPLY CURRENT	Receive Approx. 1.5 Amps Transmit Approx. 6.5 Amps
TEMPERATURE RANGE	0° C. to 50° C. Operating
SIZE	6 1/2" x 3 1/2" x 10 3/4" Deep
WEIGHT	5 Lbs.

EMERGENCY BEACON CORPORATION RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT OBLIGATION.

SECTION II

SPECIFICATIONS

RECEIVER

ALL SPECIFICATIONS AT	VDC = 13.6 Volts
FREQUENCY RANGE	143.5 - 148.5 MHz
MODULATION ACCEPTANCE	FM, ± 6 KHz Deviation
INPUT IMPEDANCE	50 Ohms Nominal Source
SENSITIVITY	0.35 uV for 12 dB SINAD
I.F. FREQUENCY	10.7 MHz
I.F. SELECTIVITY	10 Pole Crystal Filtering BW = 13 KHz @ - 6 dB BW = 22 KHz @ - 60 dB
ADJACENT CHANNEL REJECTION	≥ 60 dB @ 15 KHz ≥ 90 dB @ 30 KHz
SPURIOUS SIGNAL REJECTION	≥ 60 dB Referred to Rated Sensitivity
IMAGE REJECTION	≥ 60 dB Referred to Rated Sensitivity
INTERMODULATION (2 TONE) REJECTION	> 60 dB Above Rated Sensitivity
AM REJECTION	≥ 30 dB @ Full Quieting
I.F. REJECTION	≥ 60 dB
fo - ½ I.F. REJECTION	> 60 dB Above Rated Sensitivity
DE-EMPHASIS	- 6 dB/Octave with Reference to 1000 Hz
SQUELCH TYPE	Noise Activated
AUDIO OUTPUT	4 Watts into 3.2 Ohms @ 10% THD 5 Watts Maximum at Clipping

SECTION II

SPECIFICATIONS

TRANSMITTER

ALL SPECIFICATIONS AT	VDC = + 13.6 Volts
FREQUENCY RANGE	143.5 - 148.5 MHz
MODULATION	$\pm$ 5 KHz Deviation
R.F. OUTPUT	20 Watts into 50 Ohm Load
LOAD IMPEDANCE	50 - 75 Ohms
HARMONIC SUPPRESSION	$\geq$ 40 dB Down
NON-HARMONIC SPURIOUS OUTPUTS	$\geq$ 40 dB Down
PRE-EMPHASIS	+ 6 dB/Octave with Reference to 1000 Hz
VSWR WITHSTAND	∞, All Phases, at V in = 14.4 Volts, 1 Minute
R.F. SWITCHING	Relayless Solid State
OFFSET	Switch Selected $\pm$ 600 KHz, Simplex, or any independent combination. In Auto mode, automatically programmed for most often used offsets.

SECTION III

EXPLANATION OF CONTROL FUNCTIONS

ON/OFF

Applies power to the transceiver from the external source of 13.6 volts DC.

VOLUME

Varies audio level from speaker.

SQUELCH

Normally set just beyond point where receiver noise is silenced. A signal of usable quieting will then automatically activate the receiver. Useful in mobile operation to eliminate noise when no signal is received.

INDICATORS

These lamps indicate which TWS is active at a given time.

METER

Reads relative signal strength or relative R.F. output.

THUMBWHEEL SWITCH (TWS) A & B

These two switches are used to select the operating frequency of the transceiver. An indicator light near each switch indicates which switch is programming the synthesizer. Note that only one switch is active at a time depending on the mode of operation desired. Each switch consists of four numerals. The extreme left numeral is the MHz selector, the next is the 100 KHz then 10 KHz, and the extreme right-hand numeral is either zero or five, since the transceiver frequency must be in 5 KHz steps. In order to set a frequency, set each digit as required:

EXAMPLE:	146.940	6 9 4 0
	145.355	5 3 5 5

As will be explained, either TWS can be programmed, or both can be used for a particular mode of operation.

SECTION III

EXPLANATION OF CONTROL FUNCTIONS CON'T.

MODE SELECTOR

This sets the transmitter frequency in regard to the receiver frequency, which is indicated on the thumbwheel switches. The following table indicates what the transmitter frequency would be as a function of switch setting.

	RECEIVE FREQUENCY		
MODE SWITCH	143.500-145.955 148.000-148.500	146.000-146.995	147.000-147.995
AUTO	SAME	(RX Freq.) -600 KHz	(RX Freq.)+600 KHz
REV	SAME	(RX Freq.) +600 KHz	(RX Freq.)-600 KHz
SIMPLEX	SAME	SAME	SAME
SPLIT	TWS B	TWS B	TWS B

The receiver frequency in all cases is equal to that dialed up on the TWS with the indicator lamp lit. In AUTO, REV or SIMPLEX, this may be either A or B, but in SPLIT, the receiver frequency is always indicated on TWS A (green indicator) and the transmitter frequency is always indicated on TWS B (amber indicator).

PRIORITY SWITCH

This switch selects whether or not the priority feature is used, and which TWS is used to program the tranceiver's operating frequencies. It is interrelated with the mode selector switch.

This is explained as follows:

SECTION III

EXPLANATION OF CONTROL FUNCTIONS CON'T.

Priority Switch Con't.

Mode Selector Setting	Priority Setting	Results
AUTO,REV, or SIMPLEX	A	TWS A is programming the synthesizer, TWS B de-activated and serves no function.
AUTO,REV, or SIMPLEX	PRIORITY	TWS A is programming the synthesizer, but the receive frequency dialed on TWS B is monitored approximately every four seconds. When a signal appears on the frequency of TWS B, the receiver will switch over to that frequency and monitor the transmission irrespective of TWS A. When the signal on TWS B disappears, the receiver will automatically switch back to TWS A.
AUTO,REV, or SIMPLEX	B	TWS B is programming the synthesizer. TWS A is de-activated and serves no function.
SPLIT	A,PRI, or B	RX frequency = TWS A, TX frequency = TWS B. Priority switch is disabled and serves no function.

NOTE:

In the AUTO, REV and SIMPLEX modes, either TWS A or B can be used. This enables one to program two frequencies and switch back and forth between them via the priority switch. This is a handy feature in mobile operation, since two separate repeaters can be used without re-programming the thumbwheel switches.

SECTION IV

INSTALLATION RECOMMENDATIONS

POWER SUPPLY

The EBC-144 JR. is designed to operate from a nominal 12 volts vehicular system. This means that a range of about 11 to 15 volts can be expected. The design voltage is 13.6 volts. The supply must be negative grounded, since the chassis and case are returned to the negative side of the power source. For best performance, the supply voltage should be as "stiff" as possible. This means there should be no more than a 1 volt drop with a 6 Ampere load, with a minimum transmitter voltage preferably 12.0 volts or higher. The input voltage must not exceed 15.0 volts or damage will result. Wires used to install the EBC-144 JR. in an automobile will range from 16 AWG or heavier, depending on allowable voltage drop and the length. It is important to solidly ground the case of the transceiver both to minimize ground loop noise and stray R.F. pick-up. The EBC-144 JR. may be operated mobile with a cigar lighter plug adapter, but this is not a very good technique, due to the presence of possibly high levels of altenator ripple, and poorer voltage regulation. The recommended method of connecting the EBC-144 JR. is to run #12 gauge wires (both positive and negative) directly to the battery terminals.

ANTENNA

Any antenna having suitable characteristics can be used with the EBC-144 JR. However, the VSWR should be less than 2:1 for best receiver and transmitter performance. The EBC-144 JR. will stand higher VSWR conditions but performance will be degraded. 50 Ohm cable should be used, such as RG58/U, or preferably RG8/U.

MICROPHONE (Other Than Supplied)

A dynamic microphone can be used with the transmitter. The microphone output should be approximately 10 millivolts peak into a 2000 ohm load.

The PTT switch should be wired to furnish a ground on transmit of less than 10 ohms DC resistance.

SECTION V

THEORY OF OPERATION

(Refer to Block Diagrams & Schematics)

A) RECEIVER

The receiver is single conversion superheterodyne using a MOSFET front end and bipolar I.C. devices in the I.F. and detector. Operational amplifiers are used in the audio and squelch sections and a 5 watt I.C. is used as an audio power amplifier.

Referring to the block diagram, the signals from the antenna go through a Low Pass filter, then into a switching network. The switching network is R.F. activated and has less than 0.5 dB loss. Two R.F. amplifier stages are used with a double-tuned interstage network to obtain a flatter response and steeper skirts than with single tuned stages. The R.F. stages are followed by a MOSFET mixer. Incoming signals in the 144-148 MHz range are mixed with a synthesizer signal 10.7 MHz lower in frequency than the desired channel frequency. The resultant 10.7 MHz I.F. signal passes through a 10.7 MHz, 13 KHz BW 8 pole crystal filter. This filter establishes the receivers basic selectivity and rejects adjacent channel signals ($\pm$ 15 KHz) by more than 60 dB.

The stages of I.F. amplification bring the signal up to a level that will ensure limiting in the limiter I.C. A 2 pole crystal filter of 15 KHz BW is used before the limiter for additional selectivity and to reduce the noise bandwidth of the receiver. A CA3089E limiter I.C. performs the function of I.F. limiting, FM detection, and meter driver. Recovered audio goes through the squelch gate to the volume control. A noise activated squelch circuit senses the presence of a signal and controls the audio gate. Squelch trip level is set by varying the bias on the comparator.

Audio from the volume control goes through a stage of amplification and then to the 5 watt audio I.C. The output of the 5 watt audio stage is fed to the built-in speaker and to the external speaker jack.

THEORY OF OPERATION CON'T.

B) TRANSMITTER

The transmitter is a three stage power amplifier designed for 144 -148 MHz coverage, with 20 watts minimum R.F. output at the antenna terminals.

Referring to the block diagram, in the transmit mode, the synthesizer output frequency is 144 - 148 MHz. The output level is 100 milliwatts. A 2N4427 amplifies this to 1 watt. B+ is removed from the 2N4427 in the receive mode to prevent amplification of the 135 MHz (nominal) L.O. signal. Since the P.A. is class C, no current is drawn in the absence of drive signal.

A 2N6080 amplifies the output signal to 5-7 watts, and a 2N6082 takes the signal up to over 25 watts output. The R.F. then goes through a diode switching network and LPF to the antenna terminals. A minimum level of 20 watts appears at the antenna socket. Spurious products are down better than 40 dB.

Modulation is obtained by taking the audio from the TX audio system and applying it to the VCO in the synthesizer. The VCO runs at the output frequency and is phase locked to the internal reference in the synthesizer. AM components are removed by the inherent limiting in the synthesizer output amplifier.

The power amplifier is broadbanded and no tuning adjustments are required.

C) SYNTHESIZER

The synthesizer is a phase locked loop which compares the frequency of the unknown (in this case the VCO) against the reference 5 KHz signal derived from a 5 MHz crystal oscillator. A voltage is generated which corrects the frequency of the VCO so that it is at the predetermined frequency. Both the receiver L.O. signal and the transmitter output frequency are obtained by this technique.

Referring to the block diagram and schematic, the VCO is a Hartley oscillator which has its frequency determined by two varactor diodes and some fixed capacitors. One varactor is used as a tuning control, this varactor is biased by the correction voltage from the phase frequency detector. The other varactor is used as a band set capacitor to set the tuning range to either 143 - 149 MHz for transmitting, or 132 - 138 MHz for receiver L.O. injection. The VCO drives two buffer amplifiers - one amplifier feeds the synthesizer amplifier, which amplifies the -21 dBm VCO signal to 100 milliwatts, and the other amplifier drives a mixer.

THEORY OF OPERATION CON'T.

C) SYNTHESIZER CON'T.

Since the VCO is at VHF, the frequency is too high to be handled by the TTL Logic directly. A mixer is used to heterodyne the VCO down to the 12 to 20 MHz range. An auxilliary crystal oscillator-multiplier is used to drive the mixer. To receive the range 144 - 148 MHz, the receiver L.O. has to be 10.7 MHz lower in frequency, so that the VCO must cover 133.3 to 137.3 MHz. Therefore, a 119.3 MHz L.O. injection signal is needed to obtain a mixer output from 12 - 18 MHz.

In order to get a 5 KHz signal from the variable divider, the divide ratio must be 2800 to 3600 - this is done by using a $\div$ 2 followed by $\div$ 1400 to $\div$ 1800, the correct division ratio will be obtained, and the digit switch read-out will correspond to the receiver frequency without additional logic. Under conditions of phase lock the variable divider output frequency will always be exactly equal to the reference frequency of 5 KHz. The output frequency of the synthesizer will be:

f out receiver L.O. = f desired -10.7 MHz = .005 (divide ratio)
receiver channel + 119.3 MHz

In the transmit mode, we want to have capability to produce offsets, frequencies differing from the indicated frequency on the digit switches by a constant amount, such as 600 KHz, etc. Since our variable divider is a counter which operates by pre-loading a number and sensing when zero has been reached, this can be done by sensing a number other than zero. In the transmit mode, we sense a count of 200 if no offset (Simplex) is required. For each count more or less than 200, a 10 KHz offset is produced. This is due to the fact that we pre-scale by 2 before we actually program the divider. The 5 KHz spacing is produced by adding an additional count, 200 is used to give an offset capability of $\pm$ 2 MHz. Since our divide ratio is now smaller, we must add the additional 2MHz to our crystal heterodyne oscillator. Therefore, 132 MHz rather than a 130 MHz oscillator is required to get direct reading of transmitter frequency.

To produce a -600 KHz offset, we stop the counter at 260. To produce a +600 KHz offset, we stop at 140. For Simplex, we stop at 200. Therefore, the offset system in the EBC-144 JR. could be reprogrammed in the future should standards change.

THEORY OF OPERATION CON'T.

C) SYNTHESIZER CON'T.

The 5 KHz (approximately) signal from the variable (programmable) divider is fed to a phase-frequency detector, a MC4044. Simultaneously, a reference signal at exactly 5 KHz is fed into the MC4044. This chip and associated circuitry produce a positive going voltage if the variable divider output frequency is less than the reference, or a negative going voltage if the variable divider output frequency is greater than the reference. This DC voltage is used to control the VCO, which in turn controls the input frequency fed to the variable divider. The VCO control voltage is fed to the VCO through a notch filter network which removes 5 KHz feed-through components.

The entire system is a servo, using negative feedback, and is best understood in this manner. Operation is analogous to the 5 KHz signal serving as the reference, the value of N the command, and the difference of reference and variable divider output frequencies as the error signals.

When the synthesizer is programmed to a desired output frequency, a divide ratio N is set up. Since loop lock demands the variable divider output frequency exactly equal the reference frequency, this in turn requires the variable divider input frequency = N x reference frequency. This in turn requires that the VCO differ from the 119.3 or 132 MHz frequency by the amount = N x reference.

NOTE:

The accuracy of the output frequency is dependent on the 5 MHz oscillator and the 119.3 or 132 MHz oscillator. Both oscillators must be set exactly on frequency. An error in the 119.3 MHz or 132 MHz frequency will directly add or subtract a constant error. An error in the 5 MHz signal will cause a varying error in the output frequency, being greater for higher frequencies.

SECTION VI

TROUBLESHOOTING PROCEDURES

A) GENERAL

Before assuming the EBC-144 JR. has any malfunctions, the "obvious" should be checked. This includes the following:

1. Improper DC power supply voltages or blown in-line fuse due to accidental reversal of supply connections.

2. Microphone connection(s) broken or improperly wired.

3. Defective antenna system, or wrong system.

4. Lack of any activity on the band or trouble at the repeater site, if repeater is used.

5. Incorrect control settings or lack of familiarity with operation of transceiver.

6. Improper Installation - the receiver and transmitter may be checked for proper operation by means of a signal generator and R.F. power meter. If performance is not within specifications after all the obvious above mentioned checks have been made, it may be assumed that there is a malfunction in the transceiver.

   The best servicing procedure is to first find out the specific nature of the problem, such as no receiver audio, no R.F. output, low sensitivity, etc., and then use standard signal tracing techniques to find the defective stage, then the defective component.

TROUBLESHOOTING PROCEDURES CON'T.

B) RECEIVER

1. Check for any obvious mechanical defects (broken wires,etc.)

2. Check proper setting of all controls.

3. Check all regulators (+5, +9.6) and T-R switching (TIP-42A) stages for correct operation.

4. Check operation by coupling a signal generator to the antenna coil and inject a signal directly into the receiver. This will serve to show that trouble is either in the receiver or R.F. switching network.

5. Check source voltage of the 40673 Mixer. It should be about +1 volt and should drop to 0.5 volts or less when the synthesizer R.F. plug is removed. This checks for presence of the L.O. signal.

6. Couple a 10.7 MHz signal into the mixer drain coil via a two turn link around the cold end of coil. A 100 uV signal should quiet the receiver more than 20 dB. This checks out the I.F. system.

7. Audio systems can be checked by injecting a 10 millivolt 1 KHz signal across the volume control through a .1 ufd capacitor. Make sure squelch circuit is cut off when doing this test.

8. Check the squelch system by seeing if the comparator level goes low (2 volts) when the squelch potentiometer is turned fully counter clockwise.

9. DO NOT attempt to "tweak" receiver front end on weak signals. You will not improve the signal to noise ratio and you will ruin the flat frequency response, out of band rejection, image rejection, intermodulation and dynamic range of the receiver. The front end must be sweep aligned, which is NO job for the unskilled.

10. Adjust the quadrature coil for the best signal to noise ratio with a 0.25 uV signal. This should be done with a distortion analyzer. Audible indication here is useless and meaningless.

TROUBLESHOOTING PROCEDURES CON'T.

B) RECEIVER CON'T.

11. DO NOT attempt to align mixer coil and filter trimmer unless you have access to a narrow band sweep generator. The average laboratory sweeper will not do here.

12. The L.O. injection coil is adjusted at 146.00 MHz for maximum DC voltage at the source of the mixer. DO NOT peak it anywhere else in the band since it will not improve performance there, only degrade it at other places.

13. Voltage at the output of the squelch noise rectifiers should be approximately +4 volts with respect to ground, and should drop with increasing signal input.

C) TRANSMITTER

1. If there is no R.F. output, check the DC current drain by inserting an ammeter in series with the P.A. and primary B+ lead. If current is zero, there is a defective 2N6080 or component on the P.C. board. If the current is 1-2 Amperes, a defective 2N6082 or defective associated component is indicated. If current exceeds 7 Amperes, the trouble is probably a shorted 2N6080 or 2N6082. Transistors should be checked with an ohmmeter, leaving them on the circuit board if possible (leads on R.F. chokes, etc., can be disconnected to make the measurements). Also check the R.F. switching diodes. Since removal of transistor is difficult, make sure they are defective before removing them. Replace parts EXACTLY as they were found, with leads in the same spots as the original.

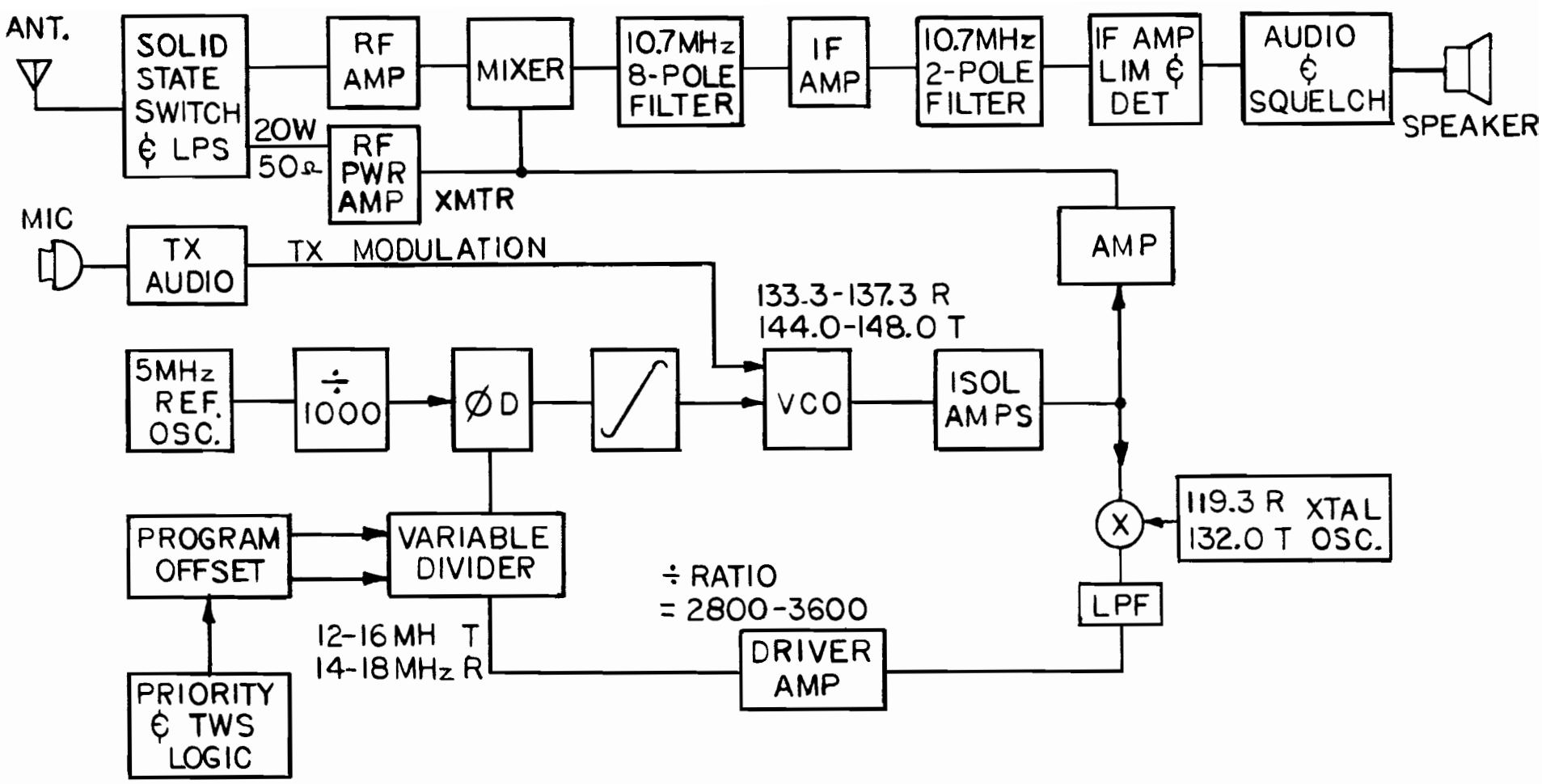
2. Check 1N914 diodes in the R.F. P.A. board for open or shorted condition. They may affect the receiver sensitivity if shorted, but no R.F. power loss will be noted.

3. DO NOT try to "tweak" anything. No tuning adjustments are provided. You may be able to pick up a watt or two if you have a spectrum analyzer, a good dummy load such as a Bird Watt meter and a lot of experience. Most likely you will damage the P.A. It is, simply stated, very difficult to make any improvement unless you have several thousand dollars worth of test equipment and are knowledgeable in the area of solid state R.F. power circuitry on an engineering level.

TROUBLESHOOTING PROCEDURES CON'T.

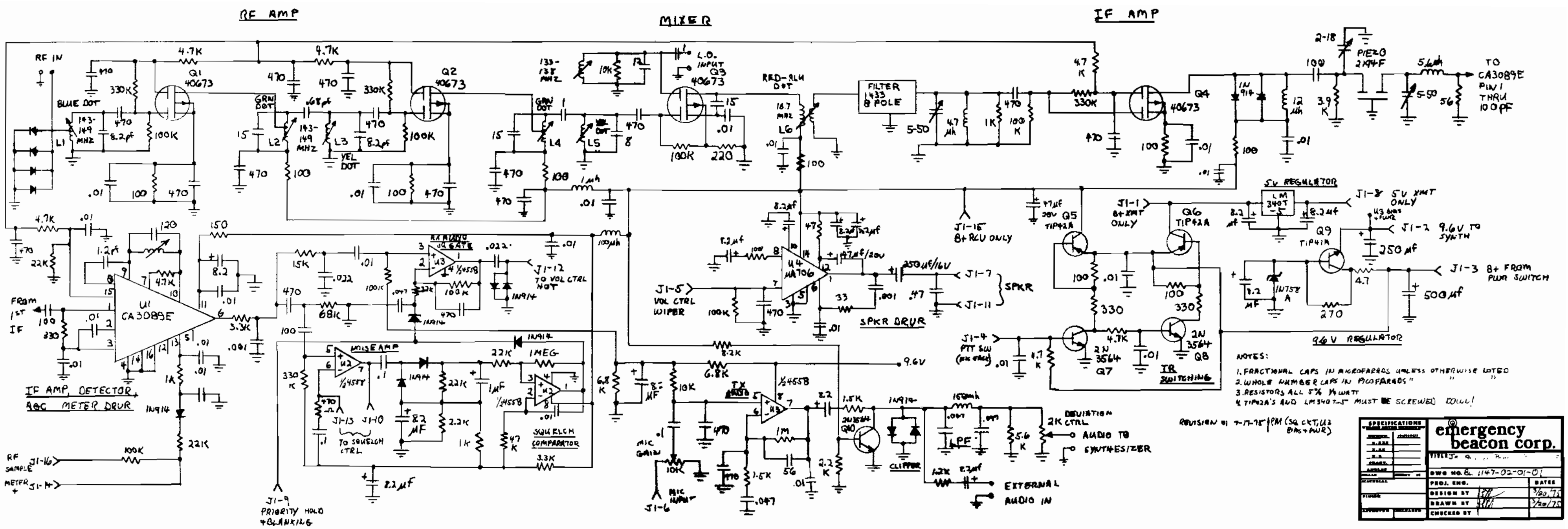
D) SYNTHESIZER

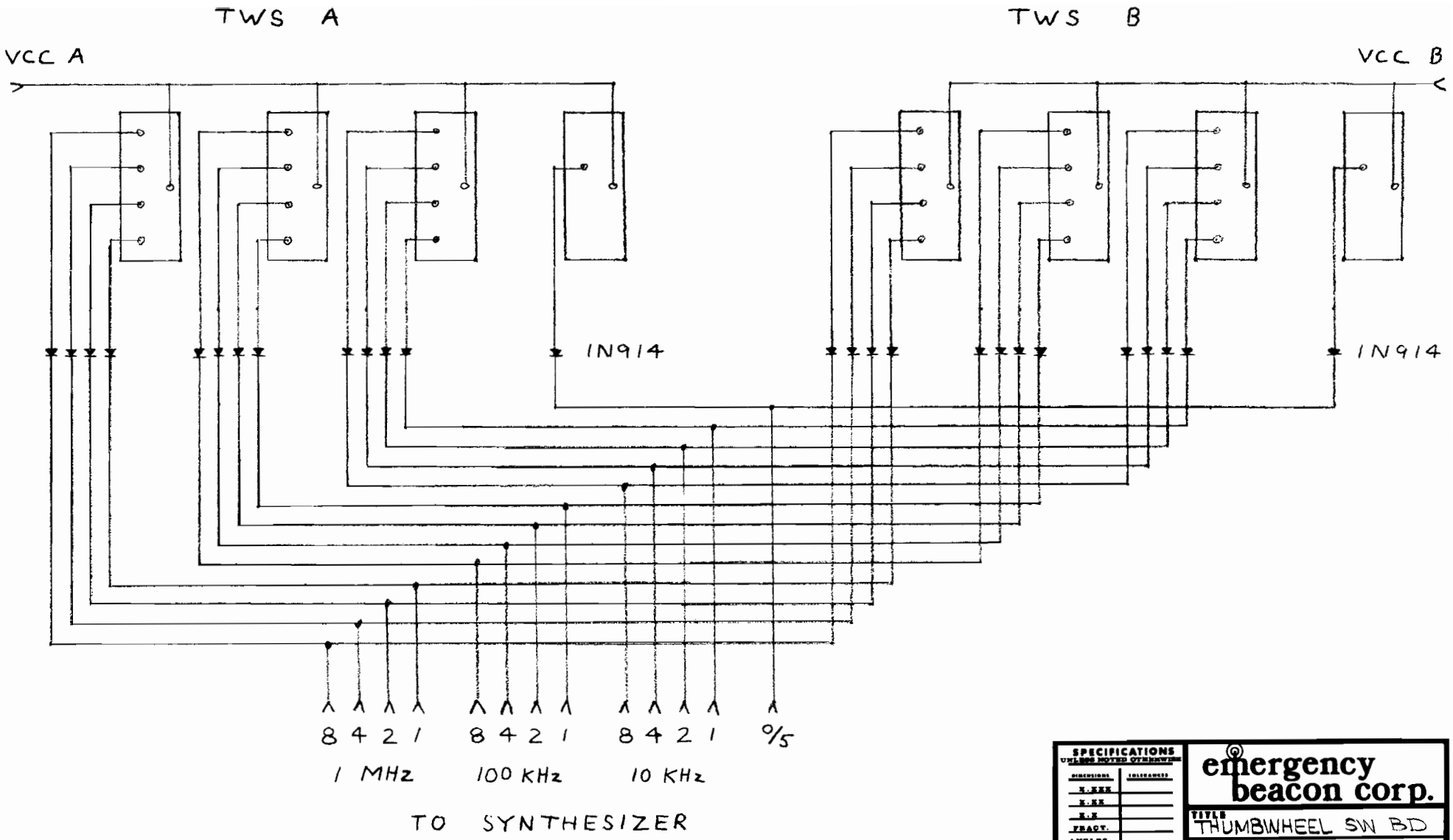
1. Other than checking for the presence of proper programming inputs, logic levels, and verifying the R.F. output with milliwatt meter and frequency counter, the synthesizer is best left alone. Specialized equipment normally not available to the amateur is required, as well as some knowledge of phase locked loops. Unless you have a very accurate counter, 100 MHz BW oscilloscope, and an R.F. voltmeter such as a Boonton 91CA, and are able to borrow a good spectrum analyzer, such as a Hewlett Packard 8554L, do not attempt to do anything at all. Without this equipment, the average amateur who happens to be an electronics engineer would have nearly no chance of finding the trouble. It would be best to consult the factory in case of synthesizer malfunction.



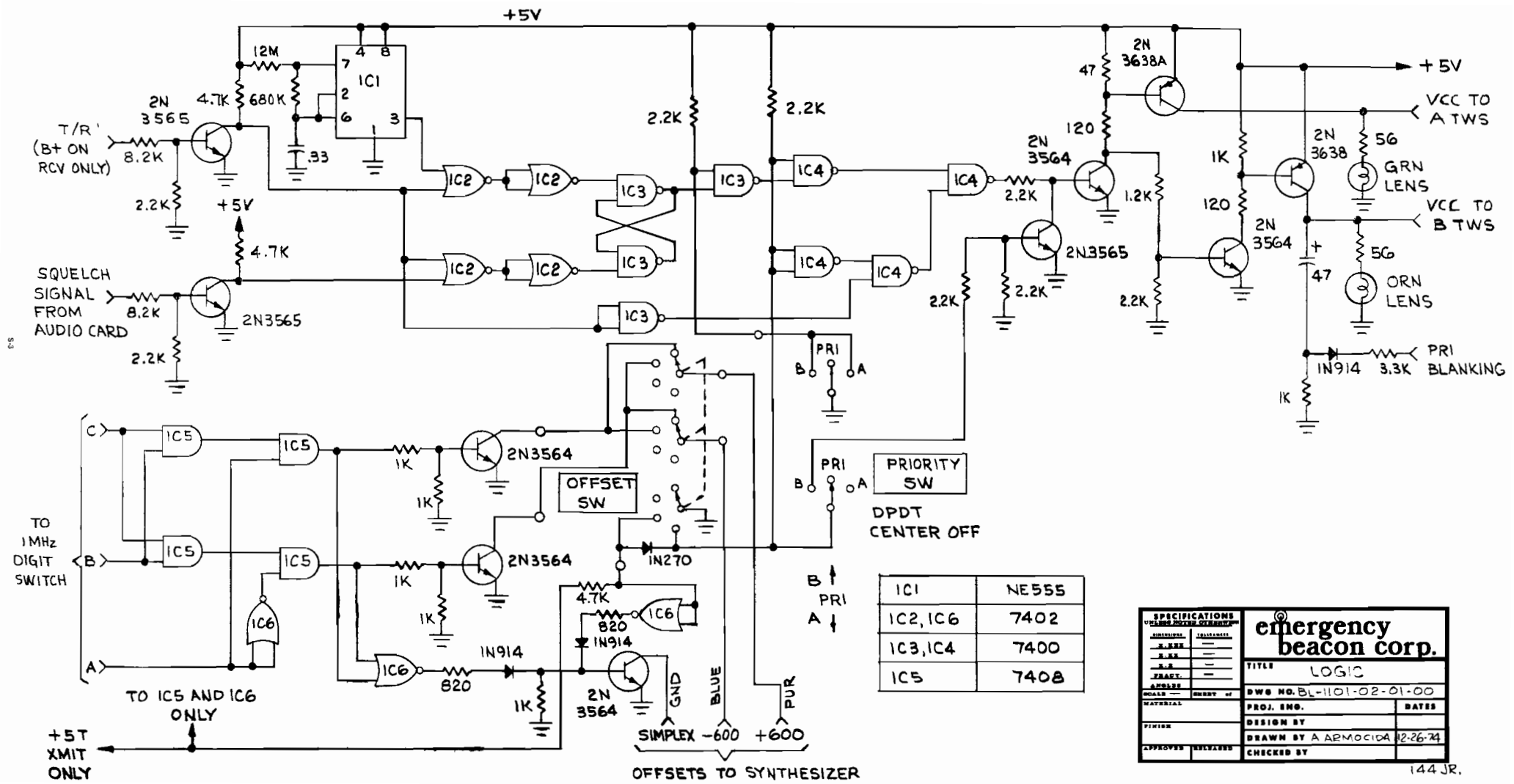
EBC 144 JR.
FREQUENCY GENERATION
SCHEMATIC & BLOCK DIAGRAM

FIG. 1


RF AMP
MIXER
IF AMP
RF IN
1N914
BLUE DOT
GRN DOT
YEL DOT
RED-BLK DOT
Q1 40673
Q2 40673
L.O. INPUT Q3 40673
Q4 40673
FILTER 1433 8 POLE
TO CA3089E PIN 1 THRU 100 PF
PIEZO 2X14F
U1 CA3089E
FROM 1ST IF
IF AMP, DETECTOR, AGC METER DRVR
RF SAMPLE J1-16
METER + J1-14
J1-9 PRIORITY HOLD + BLANKING
NOISE AMP
J1-13 J1-10 TO SQUELCH CTRL
SQUELCH COMPARATOR
J1-12 TO VOL CTRL HOT
J1-5 VOL CTRL WIPER
U4 µA706
SPKR DRVR
J1-7
J1-11
SPKR
J1-15 B+ RCV ONLY
J1-1 B+ XMT ONLY
Q5 TIP42A
Q6 TIP42A
J1-4 PTT SW
Q7 2N 3564
Q8 2N 3564
TR SWITCHING
5V REGULATOR
LM 340T -5
J1-8 5V XMT ONLY
Q9 TIP41A
J1-2 9.6V TO SYNTH
J1-3 8+ FROM PWR SWITCH
9.6V REGULATOR
1N758 A
9.6V
MIC GAIN
MIC INPUT
J1-6
TX AUDIO
Q10
CLIPPER
LPF
DEVIATION 2K CTRL
AUDIO TO SYNTHESIZER
EXTERNAL AUDIO IN
NOTES:
1. FRACTIONAL CAPS IN MICROFARADS UNLESS OTHERWISE NOTED
2. WHOLE NUMBER CAPS IN PICOFARADS " " "
3. RESISTORS ALL 5% 1/4 WATT
4. TIP42A'S AND LM340T-5 MUST BE SCREWED DOWN!
emergency beacon corp.
DWG NO. 1147-02-01-01
PROJ. ENG.
DESIGN BY
DRAWN BY
CHECKED BY
DATES
SPECIFICATIONS



SPECIFICATIONS UNLESS NOTED OTHERWISE	emergency beacon corp.
DIMENSIONS / TOLERANCES: X.XXX, X.XX, X.X, FRACT., ANGLES	TITLE: THUMBWHEEL SW BD
SCALE / SHEET of	DWG NO: B-1109-02-01-00
MATERIAL	PROJ. ENG. / DATES
FINISH	DESIGN BY
APPROVED / RELEASED	DRAWN BY A.G. / 2-26-75
	CHECKED BY



IC1	NE555
IC2, IC6	7402
IC3, IC4	7400
IC5	7408

SPECIFICATIONS

emergency beacon corp.

TITLE: LOGIC

DWG NO. BL-1101-02-01-00

PROJ. ENG.

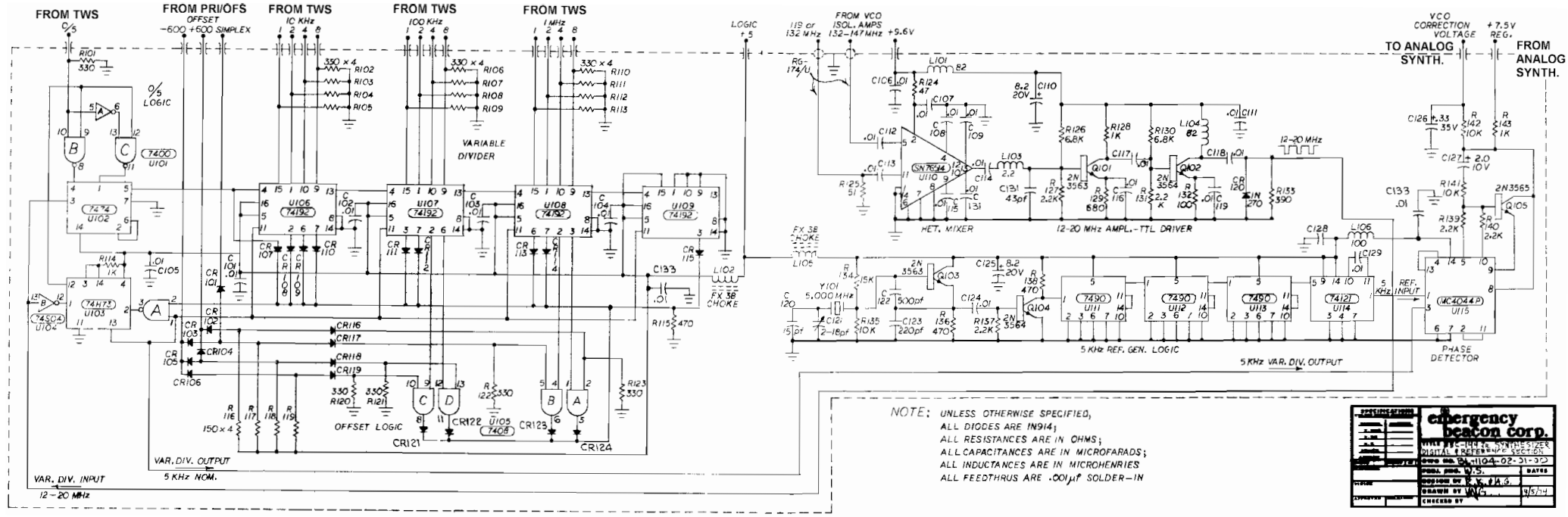
DESIGN BY

DRAWN BY A ARMOCIDA 12-26-74

CHECKED BY

DATES

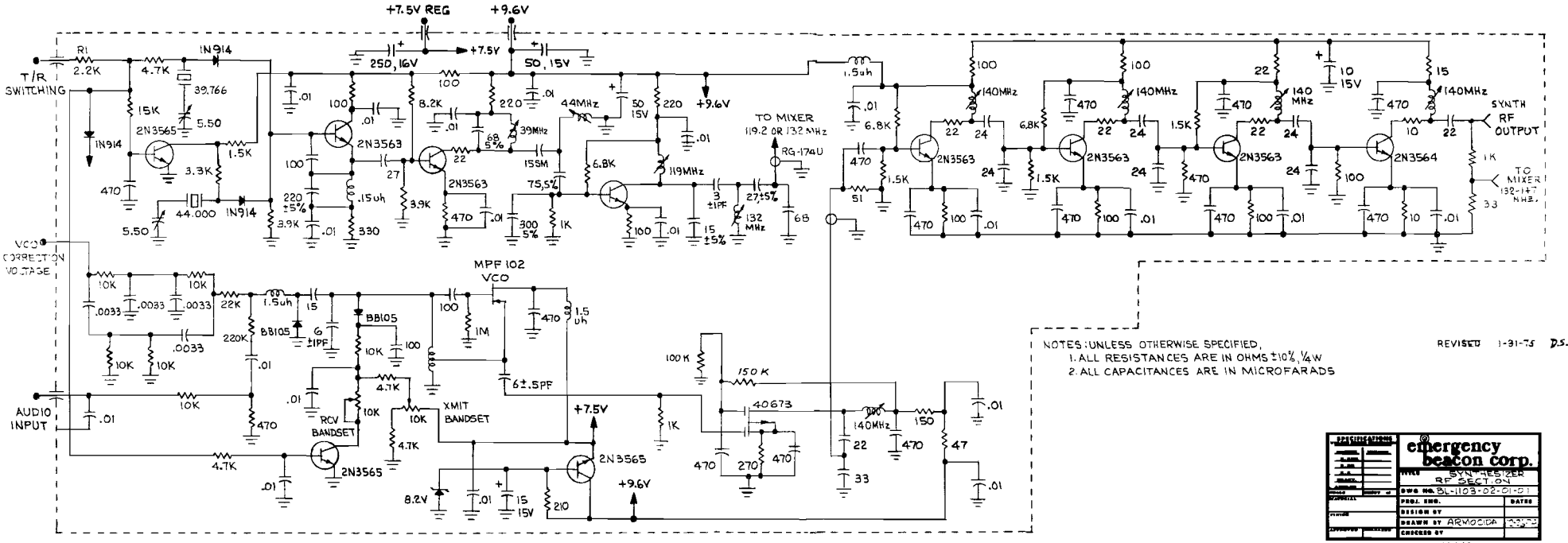
144 JR.



NOTE: UNLESS OTHERWISE SPECIFIED,
ALL DIODES ARE IN914;
ALL RESISTANCES ARE IN OHMS;
ALL CAPACITANCES ARE IN MICROFARADS;
ALL INDUCTANCES ARE IN MICROHENRIES
ALL FEEDTHRUS ARE .001μf SOLDER-IN

emergency beacon corp.

TITLE	SYNTHESIZER DIGITAL & REFERENCE SECTION
DWG. NO.	104-02-51-302
MODEL NO.	D.S.
DESIGNED BY	R.K. & A.G.
DRAWN BY	W.G. 4/5/74
CHECKED BY	



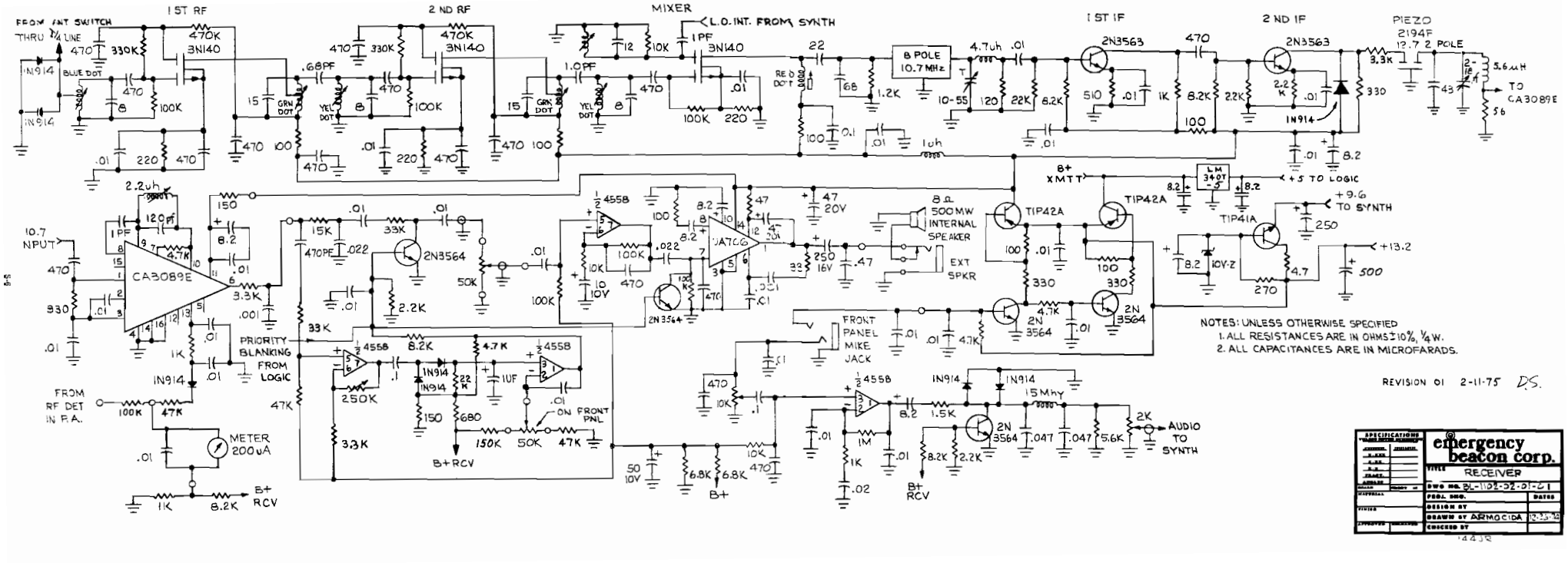
NOTES: UNLESS OTHERWISE SPECIFIED,
1. ALL RESISTANCES ARE IN OHMS ±10%, ¼W
2. ALL CAPACITANCES ARE IN MICROFARADS

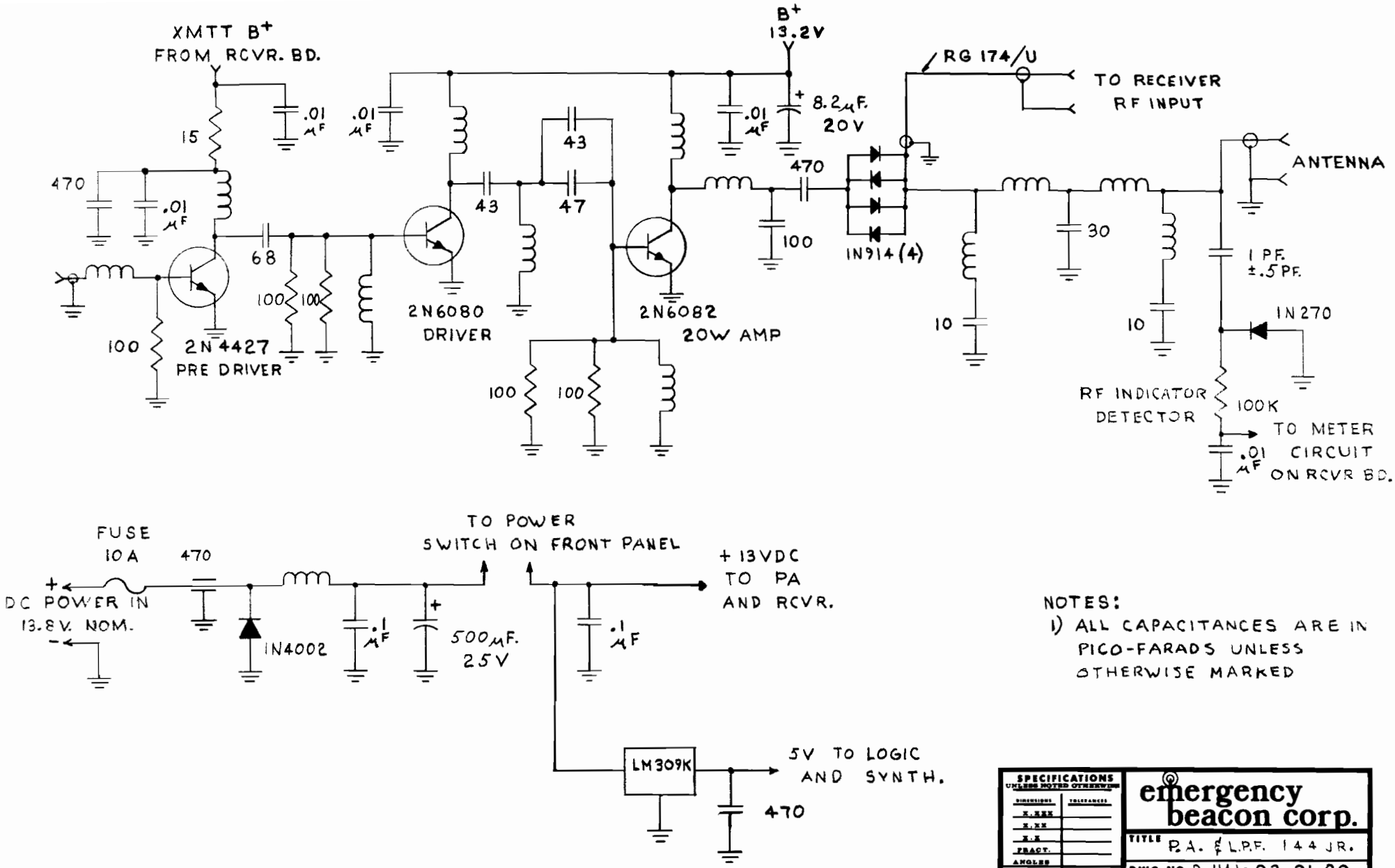
REVISED 1-31-75 D.S. 01

emergency beacon corp.

TITLE	SYNTHESIZER RF SECTION
DWG. NO.	BL-1103-02-01-01
PROJ. ENG.	DATES
DESIGN BY	
DRAWN BY	ARMOCIDA
CHECKED BY	

144 JR


1ST RF
2ND RF
MIXER
L.O. INT. FROM SYNTH
1ST IF
2ND IF
PIEZO
2194F
12.7 2 POLE
8 POLE
10.7 MHz
FROM ANT SWITCH
THRU ¼ LINE
TO CA3089E
10.7 INPUT
CA3089E
2N3563
2N3564
TIP42A
TIP41A
LM 340T-5
+5 TO LOGIC
+9.6 TO SYNTH
+13.2
B+ XMTT
8Ω 500MW INTERNAL SPEAKER
EXT SPKR
FRONT PANEL MIKE JACK
PRIORITY BLANKING FROM LOGIC
FROM RF DET IN P.A.
METER 200uA
ON FRONT PNL
AUDIO TO SYNTH
B+ RCV
B+
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTANCES ARE IN OHMS ±10%, ¼W.
2. ALL CAPACITANCES ARE IN MICROFARADS.
REVISION 01 2-11-75 DS.
emergency beacon corp.
RECEIVER
DWG NO. BL-1102-52-01-01
DRAWN BY ARMOCIDA
12-25-74



NOTES:
1) ALL CAPACITANCES ARE IN PICO-FARADS UNLESS OTHERWISE MARKED

SPECIFICATIONS UNLESS NOTED OTHERWISE	emergency beacon corp.
DIMENSIONS / TOLERANCES	
X.XXX	
X.XX	
X.X	
FRACT.	
ANGLES	
SCALE / SHEET of	TITLE P.A. & L.P.F. 144 JR.
MATERIAL	DWG NO. B-1141-02-01-00
FINISH	PROJ. ENG. / DATES
APPROVED / RELEASED	DESIGN BY
	DRAWN BY D. STROUT 3-13-75
	CHECKED BY