Instruction Booklet

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MODEL 10-1100 SERIES
PREDETECTION RECORD CONVERTERS

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MODEL 10-1100 SERIES PREDETECTION RECORD CONVERTERS

GENERAL

The Model 10-1100 Series Predetection Record Converters are designed primarily for use in the Microdyne Model 1100-R/1100-AR Telemetry Receivers. The series comprises six individual modules each of which accepts the 10 MHz second IF signal and provides a specific video carrier output suitable for recording. Data bandwidths normally associated with the video carrier signals are also provided. The model numbers and associated output frequencies of the six modules are given below.

Converter	Output
10-1100 (112.5)	112.4 kHz
10-1100 (225)	225 kHz
10-1100 (450)	450 kHz
10-1100 (600)	600 kHz
10-1100 (800)	800 kHz
10-1100 (900)	900 kHz

The electrical specifications for the converter series are listed in table 1.

Table 1. Specifications

Input Center Frequency	10 MHz.
Output Center Frequency	dependent on module.
Output Level	2V p-p with 50 mV input.
Local Oscillator Stability	±0.005%.
Data Bandwidth:	
10-1100 (112.5)	150 kHz.
10-1100 (225)	300 kHz.
10-1100 (450)	600 kHz.
10-1100 (600)	800 kHz.
10-1100 (800)	1400 kHz.
10-1100 (900)	1200 kHz.

INSTALLATION

Only one predetection record module can be installed in a receiver at any one time. The module plugs into a receptacle which has been prewired for it. For example, when used with the 1100-R receiver, the module plugs into XA19. The input to the converter is supplied by either the receiver 10 MHz limited or linear outputs on the receiver rear apron. The selected IF signal is then patched to the receiver record converter input using 50-ohm cable. The video carrier output is taken from the receiver rear apron and connected to the recording device using 75-ohm cable.

OPERATION

No operating procedures are applicable to the 10-1100 series converters.

THEORY OF OPERATION

The circuitry of the six converter modules is identical except for the crystal frequency and certain component values. Each module consists of oscillator circuit A2, oscillator driver Q1, input amplifier A1, mixer A3, and video output amplifier A4-Q2. The schematic diagram of the 10-1100 (900) converter is shown in figure 2 and is typical of the series.

The 10 MHz IF signal from the receiver is applied to P1-A1 and coupled to input amplifier A1. A1 is configured as a cascode amplifier with the output tuned to 10 MHz by L7. From A1, the signal is coupled to mixer A3 where it is heterodyned with the local oscillator input from Q1. The output of the mixer is the difference between the two inputs and is dependent upon the frequency of the LO signal. This output is coupled through low-pass filter C30-C32-L9-R28 to the input of video amplifier A4. A4 is configured as a video amplifier and drives the high level output at P1-A3. The output level is set to 2 volts peak-to-peak by gain adjustment R2. Normally, R2 is set to provide a 2 volt p-p output with a 50 mV input. Should the input level be other than 50 mV or if a higher output level (3V max) is required, R2 must be adjusted as necessary.

The local oscillator circuit consists of integrated circuit A2 and driver Q1. The output frequency of the oscillator is determined by crystal Y1 and varies between modules. Output is taken from pin 5 and is coupled to driver Q1. From Q1, the LO signal is applied to the mixer for heterodyning with the 10 MHz IF input.

MAINTENANCE

No preventive or periodic maintenance procedures are applicable to the 10-1100 series of converters. Should the unit fail to operate properly, the defective stage or stages can most easily be located by employing normal signal tracing procedures. Voltage levels for the active elements are given below to aid in fault isolation. Once the defective component is located, it should be replaced with a component of the identical value and tolerance.

	1	2	3	4	5	6	7	8	9	10	11	12
A1	+20 mV	-3V	-6V	-3.7V	0V	+6V	+3 mV	+6V				
A2	+5.4V	+6.1V	0V	-0.65V	+9.7V	+7.3V	+6.6V	+10V	+6.5V	0	+15V	+15V
A3	+0.25V	+0.8V	-0.2V	-0.9V	+4.4V	0V	-0.7V	+5V	+1.5V	-6V	+6V	+6V

	E	B	C
Q1	-9.8V	-9.2V	-0.5V
Q2	-0.32V	+1V	-6V

ALIGNMENT

The following procedure is recommended for realigning the 10-1100 series predetection record converters. The equipment listed below should be employed to obtain satisfactory results.

Extender Module	Microdyne 300-355
Signal Generator	HP606A
Distortion Analyzer	HP334A
Oscilloscope	HP180A
Voltmeter	HP412A

Procedure:

a. Remove the module cover and install the module in the receiving using the extender module.

b. Connect the HP606A generator to the receiver rear apron record input. Set the generator for a 9.4 MHz output at 50 mV RMS.

c. Connect the receiver record output to the oscilloscope "B" vertical input. Note the presence of a sine wave.

d. Connect the oscilloscope X10, 75-ohm terminated probe to channel A vertical input. Set the oscilloscope for "A" operation.

e. Connect the X10 probe to the junction of C26 and C28.

f. Adjust L7 for maximum amplitude of the display.

g. Reset the vertical input to B.

h. Set the HP606A for a 10.000 MHz output at 50 mV RMS.

i. Terminate B vertical input in 75 ohms and adjust R2 on the module for 2V p-p display.

j. Disconnect the cable and load connected to the oscilloscope B vertical input and connect it to the input of the HP334A distortion analyzer.

k. Set the analyzer for voltmeter operation and a 1 volt range.

l. The meter should indicate 0.7V RMS.

m. Note the level in dB and rotate the HP606A frequency control over the data bandwidth and note less than a 1 dB variation in the meter level.

n. Set the analyzer for distortion measurement. Set the HP606A to 10.300 MHz.

o. Measure the distortion; it should be less than 0.75%.

p. Disconnect all test equipment.

REPLACEMENT PARTS LIST

Reference Designation	Description
A1	Integrated Circuit, RCA CA3028A
A2	Integrated Circuit, RCA CA3018A
A3	Mixer, Lorch FC200R
A4	Integrated Circuit, RCA CA3018A
C1	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C2	Capacitor, tantalum, 100 μF ±20%, 20V, Kemet T362D107M020AS
C3	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C4	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C5	Capacitor, tantalum, 100 μF ±20%, 10V, Kemet T362C107M010AS
C6	Capacitor, tantalum, 100 μF ±20%, 10V, Kemet T362C107M010AS
C7	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C8	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C9	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C10	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J
C11	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C12	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C13	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C14	Capacitor, ceramic, 10 μF ±20%, 20V, Kemet T362B106M020AS
C15 thru C18	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C19	Capacitor, ceramic, 24 pF ±5%, 100V, Erie 8111-100-COG-240J
C20	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C21	Capacitor, ceramic, 110 pF ±5%, 100V, Erie 8121-100-COG-111J
C22 thru C24	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C25	Capacitor, ceramic, 100 pF ±5%, 100V, Erie 8131-100-COG-101J
C26	Capacitor, ceramic, 36 pF ±5%, 100V, Erie 8121-100-COG-360J
C27	Capacitor, ceramic, 200 pF ±5%, 100V, Erie 8121-100-COG-201J
C28	Capacitor, ceramic, 150 pF ±5%, 100V, Erie 8121-100-COG-151J
C29	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C30	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C31	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C32	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C33 thru C37	Capacitor, tantalum, 10 μF ±20%, 20V, Kemet T362B106M020AS
C38	Capacitor, ceramic, 33 pF ±5%, 100V, Erie 8121-100-COG-330J
C39	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M

Replacement Parts List, continued

Reference Designation	Description
CR1 thru CR3	Diode, Sylvania 1N914
L1	Inductor, 220 μH, Jeffers 1315-20J
L2	Inductor, 220 μH, Jeffers 1315-20J
L3	Inductor, 5.6 μH, Jeffers 4435-1K
L4 thru L6	Inductor, 120 μH, Jeffers 1315-14J
L7	Inductor, 6.8 μH, Cambion 7107-23
L8	Inductor, 4.7 μH, Jeffers 4425-14K
L9	Inductor, 5.6 μH, Jeffers 4435-1K
L10	Inductor, 220 μH, Jeffers 1315-20J
P1	Connector, Cannon DEM13W3P
Q1	Transistor, npn, RCA 2N5180
Q2	Transistor, pnp, Motorola 2N3251
R1	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R2	Resistor, variable, 10KΩ, Spectrol 53-2-1-103
R3	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R4	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R5	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R6	Resistor, fixed composition, 1.5KΩ ±5%, ¼w, Allen Bradley CB1525
R7	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
R8	Resistor, fixed composition, 20KΩ ±5%, ¼w, Allen Bradley CB2035
R9	Resistor, fixed composition, 20KΩ ±5%, ¼w, Allen Bradley CB2035
R10	Resistor, fixed composition, 22Ω ±5%, ¼w, Allen Bradley CB2205
R11	Resistor, fixed composition, 10Ω ±5%, ¼w, Allen Bradley CB1005
R12	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R13	Resistor, fixed composition, 1.5KΩ ±5%, ¼w, Allen Bradley CB1525
R14	Resistor, fixed composition, 2KΩ ±5%, ¼w, Allen Bradley CB2025
R15	Resistor, fixed composition, 22Ω ±5%, ¼w, Allen Bradley CB2205
R16	Resistor, fixed composition, 39KΩ ±5%, ¼w, Allen Bradley CB3935
R17	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R18	Resistor, fixed composition, 620Ω ±5%, ¼w, Allen Bradley CB6215
R19	Resistor, fixed composition, 22Ω ±5%, ¼w, Allen Bradley CB2205
R20	Resistor, fixed composition, 2.7KΩ ±5%, ¼w, Allen Bradley CB2725
R21	Resistor, fixed composition, 820Ω ±5%, ¼w, Allen Bradley CB8215
R22	Resistor, fixed composition, 3KΩ ±5%, ¼w, Allen Bradley CB3025
R23	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105

Replacement Parts List, continued

Reference Designation	Description
R24	Resistor, fixed composition, 2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2025
R25	Resistor, fixed composition, 10Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1005
R26	Resistor, fixed composition, 510Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R27	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R28	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R29	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R30	Resistor, fixed composition, 510Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R31	Resistor, fixed composition, 16Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1605
R32	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R33	Resistor, fixed composition, 2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2025
R34	Resistor, fixed composition, 2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2025
R35	Resistor, fixed composition, 75Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB7505
R36	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R37	Resistor, fixed composition, 22KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2235
R38	Resistor, fixed composition, 820Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB8215
R39	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R40	Not Assigned
R41	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R42	Resistor, fixed composition, 110Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1115
R43	Resistor, fixed composition, 30Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB3005
R44	Resistor, fixed composition, 30Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB3005
Y1	Crystal, CR-64/U (frequency dependent on module)

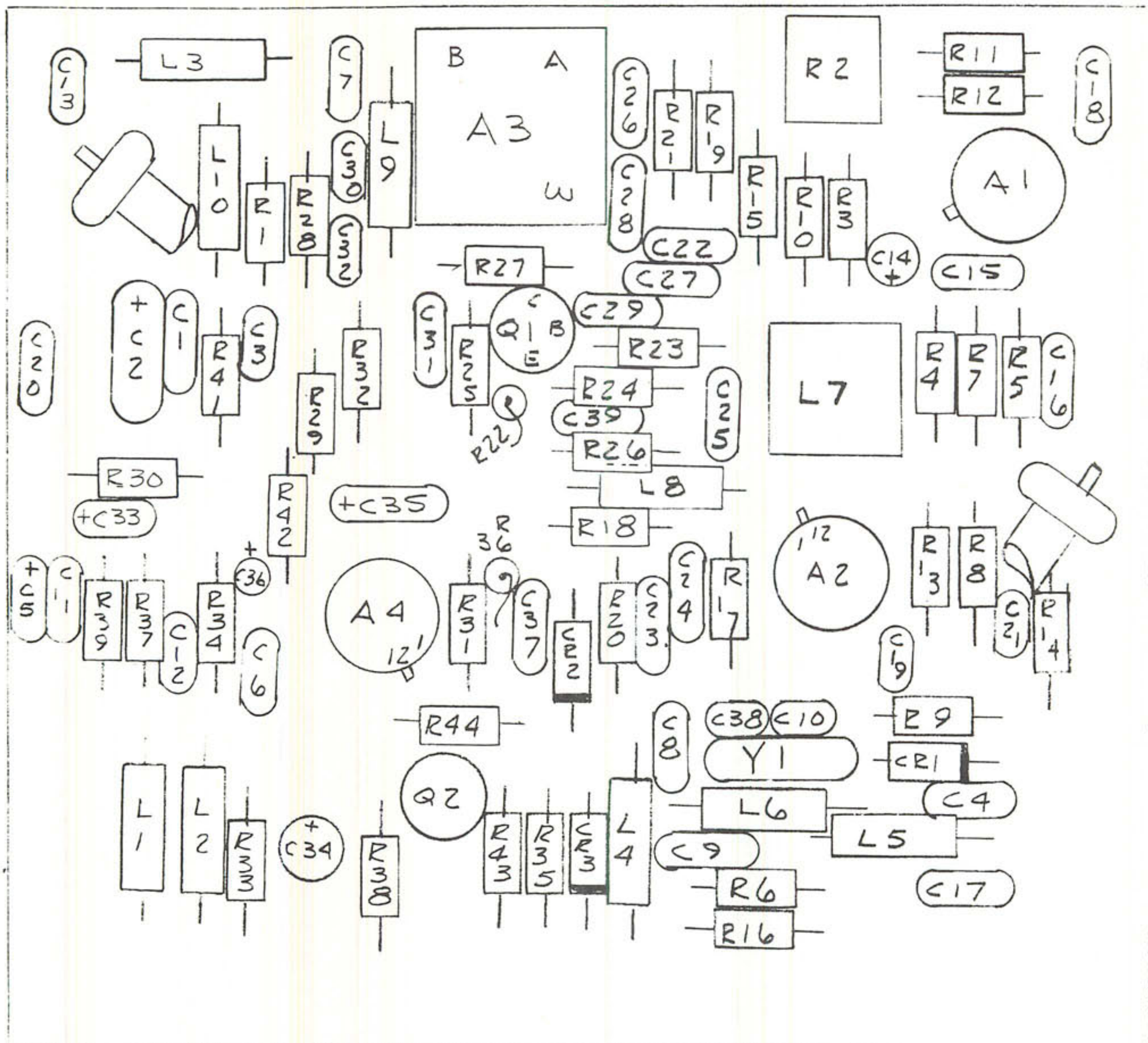
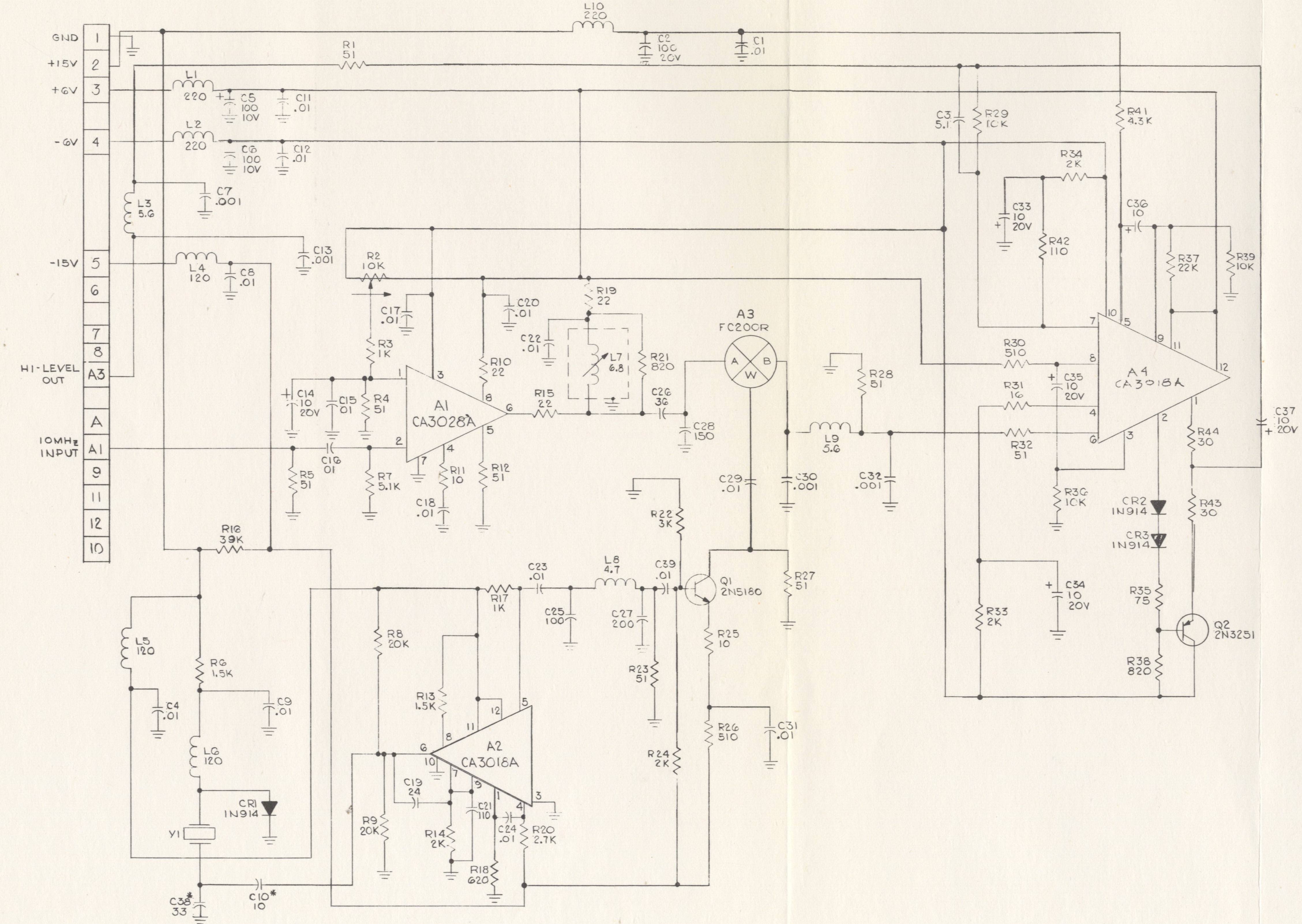


Figure 1. Record Converter,
Component Location



HIGHEST REF DESIGNATION USED			
A4	CR3		
C40	Y1		
L10			
Q2			
R44			
REF DESIGNATION NOT USED			

NOTES
1- CAPACITOR VALUES GREATER THAN 1 ARE IN pf UNLESS OTHERWISE NOTED.
2- CAPACITOR VALUES LESS THAN 1 ARE IN µf UNLESS OTHERWISE NOTED.
3- INDUCTOR VALUES ARE IN µh UNLESS OTHERWISE NOTED.
4- RESISTORS VALUES ARE IN OHMS AND ARE 1/4 WATT UNLESS OTHERWISE NOTED.
5. * FACTORY SELECTED VALUE

Figure 2. Record Converter, Schematic Diagram