

Model DC-4 Frequency Agile FM Down convertor

Guide to Operations

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WARRANTY AND ASSISTANCE

All Belar products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, FOB factory or, in the case of certain major components listed in the instruction manual, for the specified period. Belar will repair or replace products which prove to be defective during the warranty period provided that they are returned to Belar prepaid. No other warranty is expressed or implied. Belar is not liable for consequential damages.

For any assistance, contact your Belar Sales Representative or Customer Engineering Service at the Belar factory.

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1 General Information

1-1 General Description

The Belar DC-4 Frequency Agile FM Down Converter is a microprocessor controlled, tunable down convertor designed for use with Belar's complete line of FM monitors, including the FMM-1 series, the FMM-2 series, and The Wizard (model FMMA-1). It features 10 memory locations for one-button access to 10 stations with call letters. Direct dial of any standard FM frequency is also possible, and UP/DOWN buttons are included. The station's call letters can be programmed into the display with the frequency for quick and easy reference.

When equipped with the optional Wizard Interface Kit, the DC-4 will also enable the Wizard to perform AM Noise, Synchronous AM Noise, and RF Level measurements, and can be operated remotely.

1-2 Physical Description

The DC-4 is constructed on a standard EIA 1 $\frac{3}{4}$ x 19 inch rack mount panel (one EIA rack unit). Operational controls are front panel mounted. The RF input and IF (650 kHz) outputs are BNC connectors located on the rear of the unit.

1-3 Electrical Description

The DC-4 is a solid state down convertor designed to accurately down convert FM signals for measurement and monitoring purposes. Presets and other settings are stored in non-volatile memory in the unit so that no settings are lost in the event of power failure.

1-4 Electrical and Mechanical Specifications

RF Input	1 to 10 volts RMS 50 Ω , BNC Connector
RF Frequency Range	87.75 - 108.0 MHz in 50 kHz increments
Output	650 kHz IF
Signal-to-Noise Ratio	85 dB

Dimensions	1 EIA Rack Unit 1.75"H x 10.5"D x 19"W
Power Requirements	100-240 VAC, 50/60 Hz
Power Consumption	15 Watts
Shipping Weight	10 lbs (4.5 kgs)

2 Installation

2-1 Initial Inspection

Check the shipping carton for external damage. If the carton exhibits evidence of abuse in handling (holes, broken corners, etc.), ask the carrier's agent to be present when the unit is unpacked. Carefully unpack the unit to avoid damaging the equipment through use of careless procedures. Inspect all equipment for physical damage immediately after unpacking. Bent or broken parts, dents and scratches should be noted. If damage is found, refer to Paragraph 2-2 for the recommended claim procedure. Keep all packing material for proof of damage claim or for possible future use.

The DC-4 is shipped with an instruction book, three wire line cord, four black rack mount screws, and a coaxial cable patch cord.

2-2 Claims

If the unit has been damaged, notify the carrier immediately. File a claim with the carrier or transportation company and advise Belar of such action to arrange the repair or replacement of the unit without waiting for a claim to be settled with the carrier.

2-3 Repacking for Shipment

If the unit is to be returned to Belar, attach a tag to it showing owner and owner's address. A description of the service required should be included on the tag. The original shipping carton and packaging materials should be used for reshipment. If they are not available or reusable, the unit should be repackaged in the following manner:

- a. Use a double-walled carton with a minimum test strength of 275 pounds.
- b. Use heavy paper or sheets of cardboard to protect all surfaces.
- c. Use at least 4 inches of tightly packed, industry approved, shock absorbing material such as extra firm polyurethane foam or rubberized hair. **NEWSPAPER IS NOT SUFFICIENT FOR CUSHIONING MATERIAL!**
- d. Use heavy duty shipping tape to secure the outside of the carton.
- e. Use large FRAGILE labels on each surface.
- f. Return the unit, freight prepaid. Be sure to insure the unit for full value.

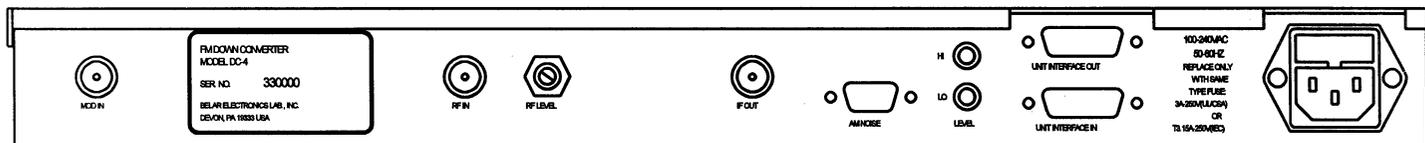
2-4 Preparation for Use

The DC-4 Digital FM Down Converter is designed to be mounted in a standard 19-inch rack. When the unit is mounted above high heat generation equipment such as power amplifiers, consideration should be given to cooling requirements which allow a free movement of cooler air around the DC-4. In no instance should the ambient chassis temperature be allowed to rise above 45°C (113°F).

The Model DC-4 can be operated from a 105 to 240VAC, 50 to 60 Hz power source, with no user adjustments.

2-5 Interconnections & Controls

DC-4 Rear Panel Jacks



- RF IN** RF Input: connect your RF input to this jack. Nominal input is 1V RF for proper operation. (See Set-up instructions for more details).
- Input Adjust** Adjusts the RF input to the proper level (5 bars lit on the front panel). If equipped with the AM Noise Option, adjust the RF input so both the Hi and Lo Level lights are extinguished.
- IF Out** IF output (650 kHz) for connection to the IF Input jack of Belar FMM-2 FM Modulation Monitor, or IF Input jack of The Wizard (with demod). Note that when operating the Belar FMM-2 with the DC-4, the IF Jack on the FMM-2 must be used and the RF/IF slide switch on the back of the FMM-2 must be set in the IF position.

Optional Wizard Interface Kit

- AM Noise** This jack is intended to be connected to jack J13 (Down Converter Interface Connector) of The Wizard (FMMA-1). Use the multi-conductor D-connector interface provided with the DC-4. If an extension or longer cable is needed, wire the pins "straight through" (pin 1 to 1, 2 to 2, etc). The first 7 pins are used.
- Level Hi**
Level Lo If lit, indicates input level is too high or too low. Note that the interface cable must be connected to both the DC-4 and the FMMA-1 for this light to be operational. See *Section 3* for more details.
- Unit Interface In** This interface is used to connect to The Wizard (FMMA-1) for unified remote operation. It can also connect to a jack labeled Unit Interface Out on other interface-equipped Belar equipment, such as the Belar FMSA-1 Digital FM Stereo Monitor.

Unit Interface Out This interface is used to connect other Wizard-interface-equipped equipment, such as the Belar FMSA-1 Digital FM Stereo Monitor, to The Wizard (FMMA-1) for combined remote operation. The interface works in a daisy-chain configuration, with the FMMA-1 at the start of the chain, connected to the Unit Interface In on the DC-4 or other unit. The Unit Interface Out of the DC-4 is then connected to the Unit Interface In jack of the next unit (the FMSA-1, for example), and so forth.

3 Operation

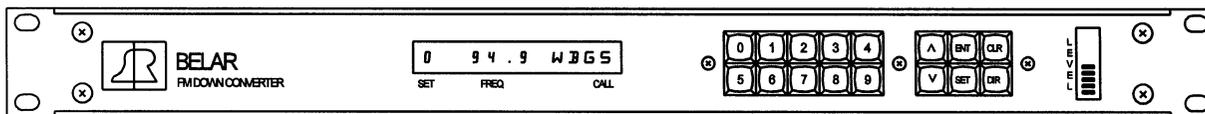
3-1 Initial Operation

1. Turn the Input Adjust potentiometer on the back of the unit all the way down to minimum (counterclockwise).
2. Connect your transmitter sample cable to the RF Input Jack on the back of the unit.
3. Connect the IF Output jack to the Belar FMM-2 FM Modulation Monitor IF Input jack, or The Wizard (with demod) IF Input jack. If the DC-4 is equipped with the optional Wizard Interface Kit and the DC-4 is being used with The Wizard (FMMA-1), connect the multi-conductor D-connector-terminated cable to the AM Noise jack of the DC-4 and the Down Converter Interface Connector (J14) of the FMMA-1.

Note: If you are using the Belar FMM-2, also move the RF/IF slide switch on the back of the FMM-2 to the IF position.

4. Plug in the line cord.
5. Slowly raise the input level by turning the input adjust pot clockwise until 5 bars are lit on the level indicator. The level indicator is linear, and 10 bars lit means the input level is too high by at least a factor of 2. If the AM Noise option is installed, the input level should be adjusted so that both the level LEDs on the back panel are extinguished.

3-2 Front Panel Indicators and Controls



The Belar DC-4 has 10 preset memory locations for one-touch access. In addition, direct entry of frequencies is possible, as is manually scaling up or down the band. The display shows the currently selected preset, frequency and call letters (when programmed).

The RF Level indicator shows the strength of the RF Input. Exactly 5 bars should be lit for proper operation.

3-3 Setting or Changing the preset

Press **SET**. The unit will flash **ENTER PRESET** and blank out. Press the desired memory location (**0-9**). The unit will flash **ENTER FREQ** and blank out. Using the numeric keypad, enter the desired frequency. If you press the trailing **0** (e.g. you enter **88.10**) the frequency will be automatically entered; if you omit the trailing **0** (e.g. **88.1**) you must press **ENT** to select the frequency. The unit will then flash **ENTER CALL** and display **W** (the suggested first letter). Use the **^** and **V** keys to run through the alphabet for the first character of the call letter display. Then press **ENT** to move to the next character position. When all the call letters are entered, press **ENT** a final time to store the frequency and call letters in the memory location you selected.

3-4 Preset Selection

Press the desired preset number (**0-9**). The programmed station will be tuned in and the display will indicate the frequency and call letters (if programmed). If the preset has never been programmed, the unit will display **NO PROGRAM**.

3-5 Direct Dial (for non-programmed stations)

Press **DIR**. The unit will prompt **ENTER FREQ.** and blank out. Using the numeric keypad, enter the desired frequency. If you press the trailing **0** (e.g. you enter **88.10**) the frequency will be automatically entered; if you omit the trailing **0** (e.g. **88.1**) you must press **ENT** to select the frequency.

3-6 Manual Scanning

Use the **^** and **v** keys to manually step up or down the FM band, in 50 kHz increments. The tuning range of the DC-4 is from 87.75 MHz to 108.0 MHz.

4 Diagrams, Schematics and Parts Lists

Replaceable Parts. This page contains information for ordering replaceable parts for the unit. The tables that follow list the parts in alphanumeric order by reference designation and provides a description of the part with the Belar part number.

Ordering Information. To order a replacement part from Belar, address the order or inquiry to Belar and supply the following information:

- a. Model number and serial number of unit.
- b. Description of part, *including the reference designation and location.*

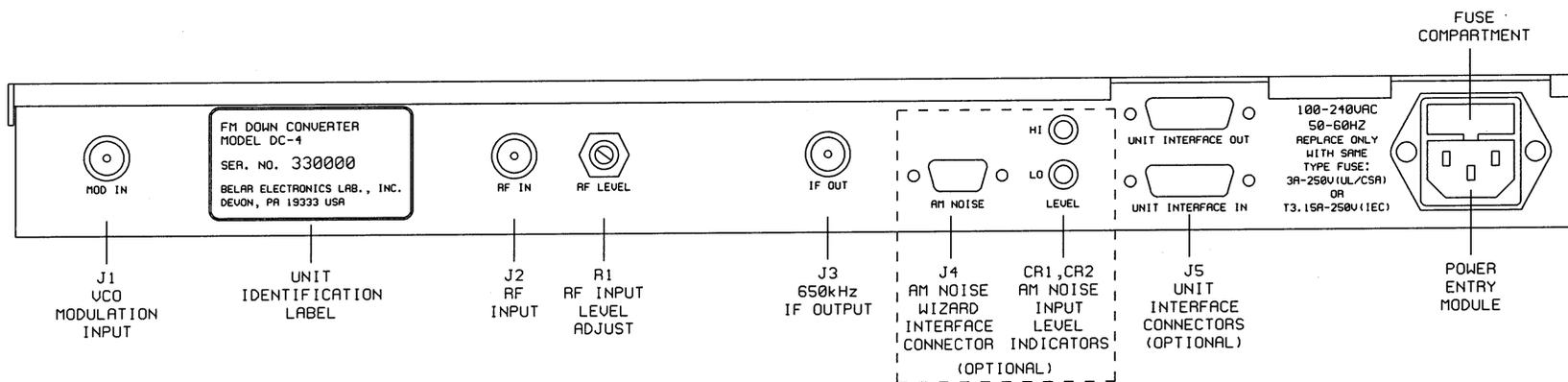
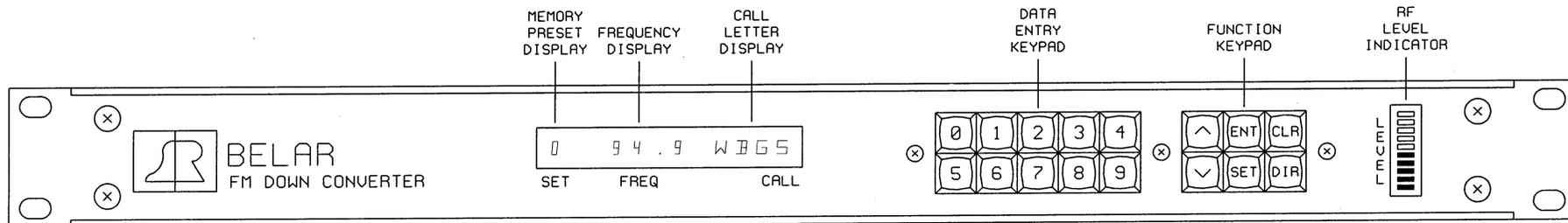
Orders may also be taken over the telephone.

REFERENCE DESIGNATORS

A	= assembly	J	= jack	S	= switch
BR	= diode bridge	L	= inductor	T	= transformer
C	= capacitor	M	= meter	TB	= terminal block
CR	= diode or LED	P	= plug	U	= integrated circuit
DS	= display or lamp	Q	= transistor	W	= cable
F	= fuse	R	= resistor	X	= socket
FL	= filter	RL	= relay	Y	= crystal
HDR	= header connector	RN	= resistor network		

ABBREVIATIONS

BCD	= binary coded decimal	PIV	= peak inverse voltage
CER	= ceramic	POLY	= polystyrene
COMP	= composition	PORC	= porcelain
CONN	= connector	POT	= potentiometer
DPM	= digital panel meter	SEMICON	= semiconductor
ELEC	= electrolytic	SI	= silicon
GE	= germanium	TANT	= tantalum
IC	= integrated circuit	uF	= microfarads
k	= kilo = 1,000	V	= volt
M	= meg = 1,000,000	VAR	= variable
MOD	= modulation	VDCW	= dc working volts
MY	= Mylar	W	= watts
PC	= printed circuit	WW	= wirewound
pF	= picofarads		



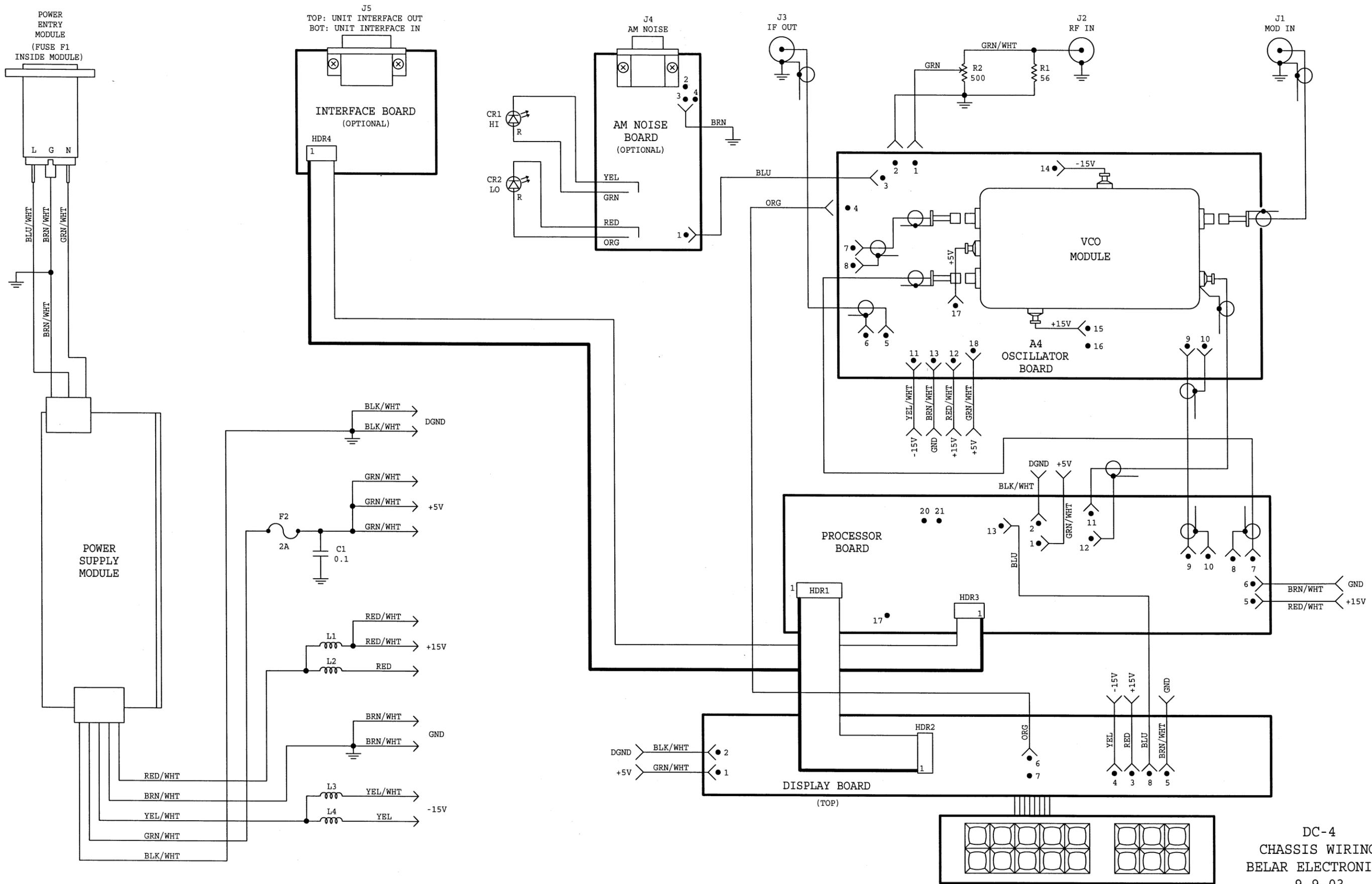
DC-4 FRONT & REAR VIEW
BELAR ELECTRONICS

DC-4 PARTS LISTS

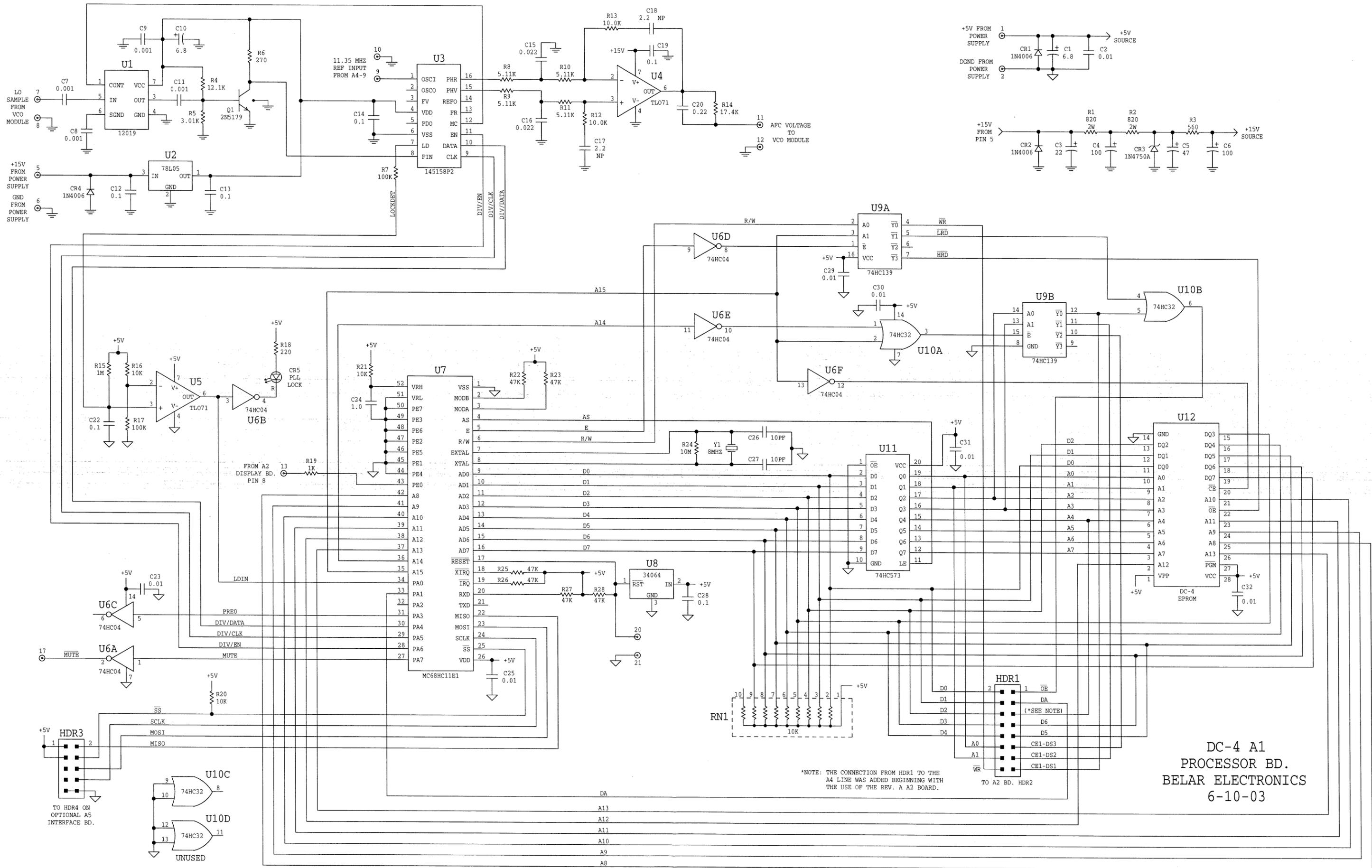
MAIN CHASSIS

Reference Designation	Description	Part Number
A3	POWER SUPPLY MODULE: 15W	4005-0019A
C1	C: FIXED CERAMIC 0.1uF 50V	0151-0006
CR1, CR2	LED: RED MV5053 (NOTE 1)	1910-0001
--	POWER ENTRY MODULE: 6EGG1-1	0360-0021
F1	FUSE: GMA-3A 250V(UL/CSA) or T3.15A-250V(IEC)	2110-0009
--	FUSE HOLDER: CHASSIS MOUNT	2110-0010
F2	FUSE: AGC 2A 250V	2110-0006
J1 thru J3	JACK: BNC	0360-0005
L1 thru L4	CHOKER: RF	9140-0011
R1	R: VAR COMP 500 2W	2100-0015
R2	R: FIXED NON-IND 56 20W	0811-0021
--	FLAT CABLE ASSEMBLY: 10 CONDUCTOR (NOTE 1)	8900-0012
--	FLAT CABLE ASSEMBLY: 16 CONDUCTOR	8900-0013
--	LINE CORD	8120-0002

NOTE 1: CR1, CR2 AND THE 10 CONDUCTOR FLAT CABLE ASSEMBLY ARE ONLY INSTALLED WITH OPTION 01.

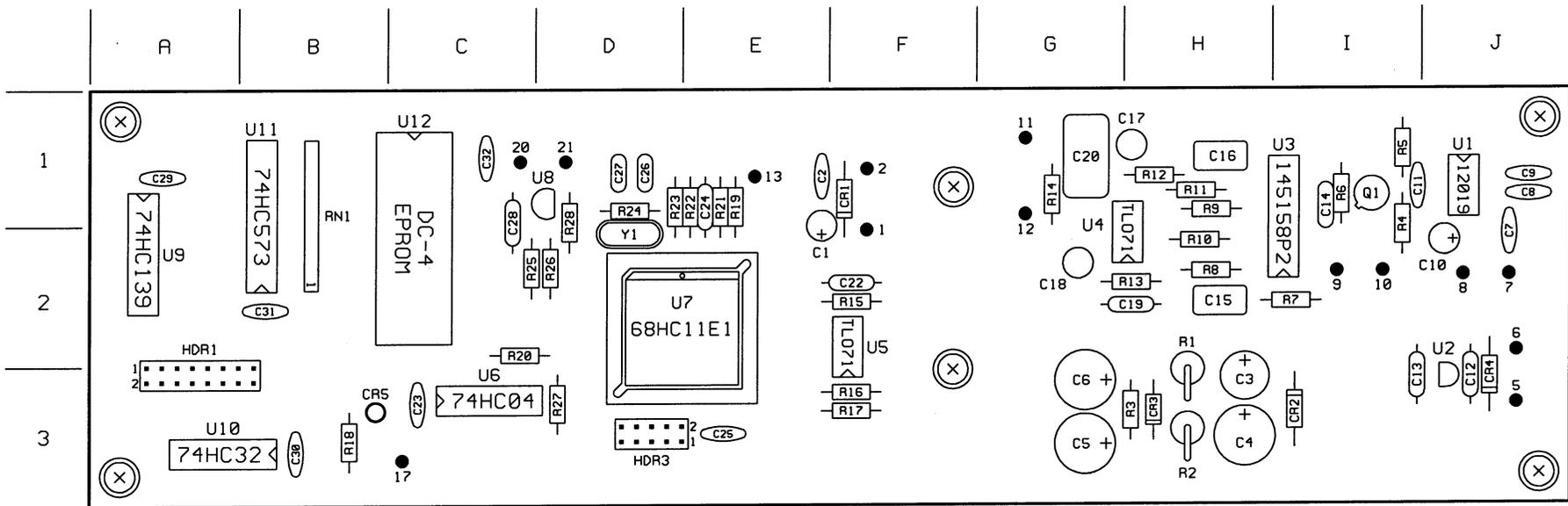


DC-4
CHASSIS WIRING
BELAR ELECTRONICS
9-9-03

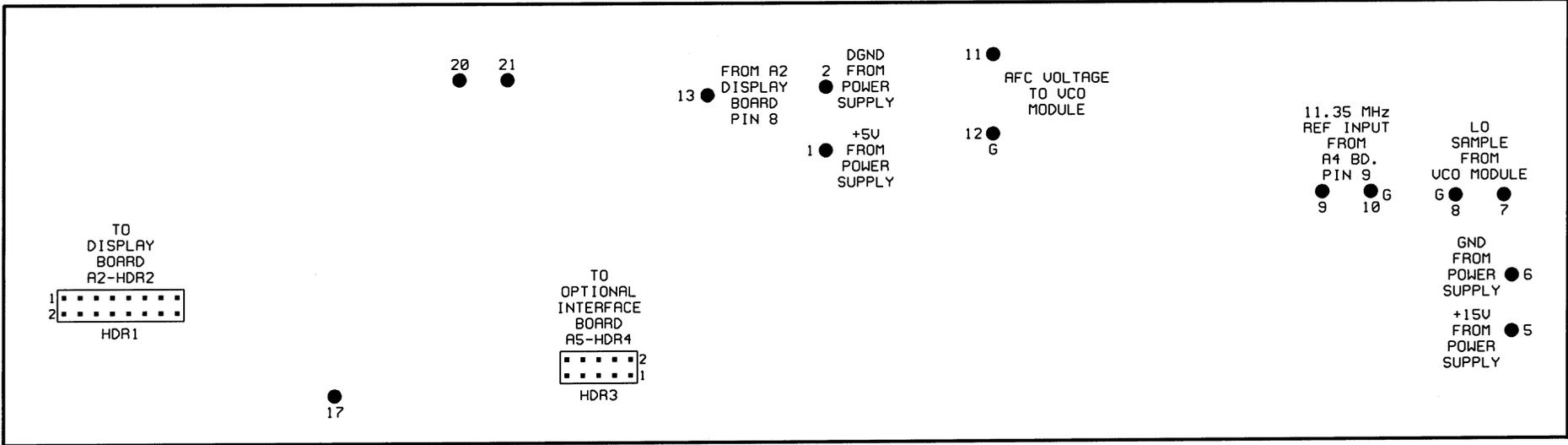


DC-4 A1
PROCESSOR BD.
BELAR ELECTRONICS
6-10-03

*NOTE: THE CONNECTION FROM HDR1 TO THE A4 LINE WAS ADDED BEGINNING WITH THE USE OF THE REV. A2 BOARD.



DC-4 A1
 PROCESSOR BOARD
 COMPONENT LAYOUT
 BELAR ELECTRONICS



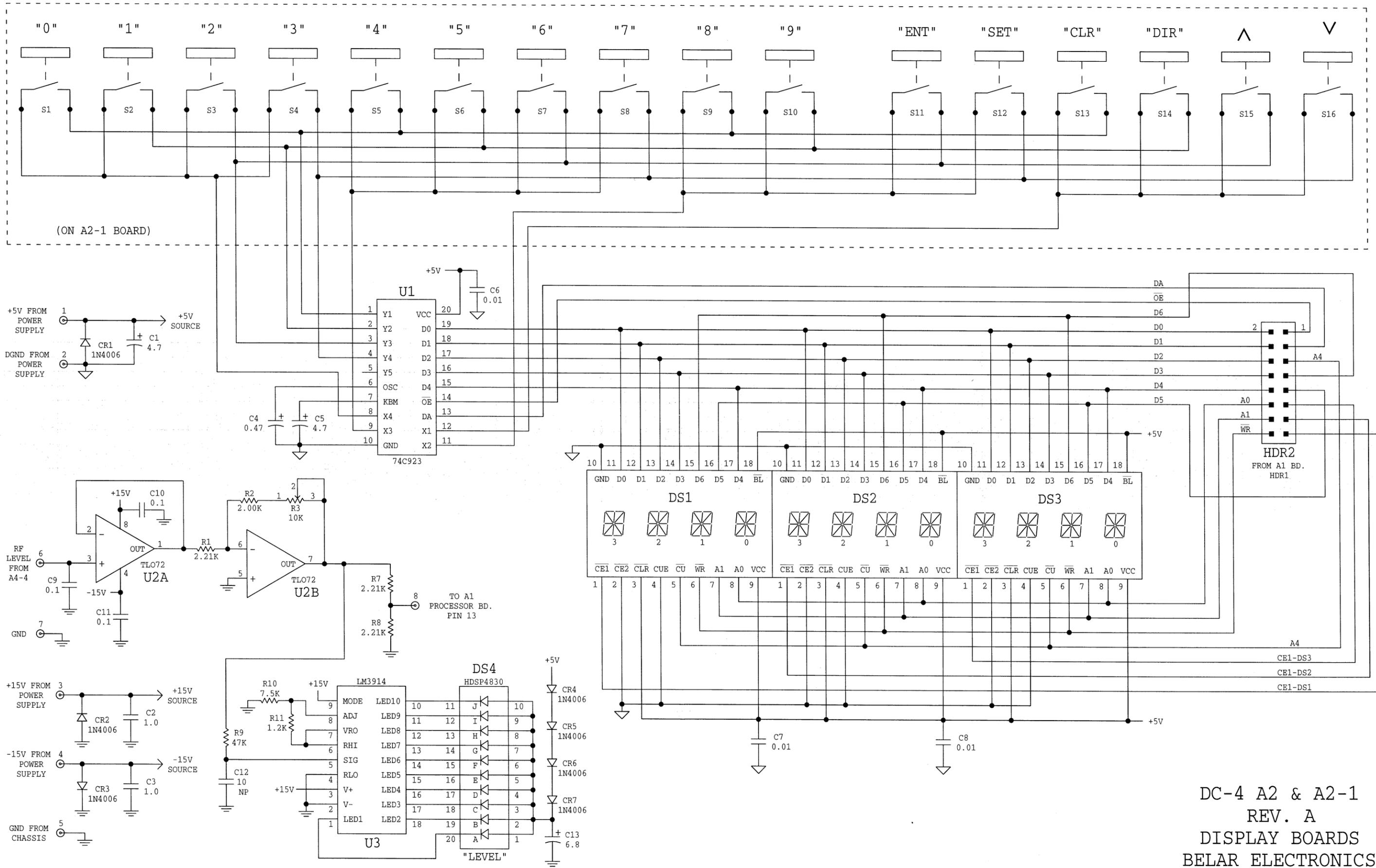
DC-4 A1
PROCESSOR BOARD
CONNECTION DRAWING
BELAR ELECTRONICS

A1 PROCESSOR BOARD DC-4

Reference Designation	Description	Part Number
C1	C: FIXED TANT 6.8uF 25V	0185-0002
C2	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C3	C: FIXED ELEC 22uF 100V	0180-0031
C4	C: FIXED ELEC 100uF 63V	0180-0032
C5	C: FIXED ELEC 47uF 50V	0180-0017
C6	C: FIXED ELEC 100uF 35V	0180-0018
C7 thru C9	C: FIXED CERAMIC 0.001uF 1kV	0151-0002
C10	C: FIXED TANT 6.8uF 25V	0185-0002
C11	C: FIXED CERAMIC 0.001uF 1kV	0151-0002
C12 thru C14	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C15, C16	C: FIXED POLY 0.022uF 10% 100V	0122-2231
C17, C18	C: FIXED ELEC 2.2uF 50V NON-POLAR	0180-0030
C19	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C20	C: FIXED POLY 0.22uF 10% 100V	0122-2241
C21	not used	
C22	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C23	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C24	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C25	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C26, C27	C: FIXED MICA 10pF 5%	0142-1005
C28	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C29 thru C32	C: FIXED CERAMIC 0.01uF 100V	0151-0003
CR1, CR2	DIODE: 1N4006	1900-0016
CR3	DIODE: 1N4750A	1900-0004
CR4	DIODE: 1N4006	1900-0016
CR5	LED: RED	1910-0004
HDR1	HEADER: 16 PIN	0361-0016
HDR3	HEADER: 10 PIN	0361-0010
Q1	TRANSISTOR: 2N5179	1850-0023
R1, R2	R: WIREWOUND 820 5% 2W	0811-0020
R3	R: METAL FILM 560 2% 1/4W	0751-5612
R4	R: METAL FILM 12.1k 1%	0721-1212
R5	R: METAL FILM 3.01k 1%	0721-3011
R6	R: METAL FILM 270 2% 1/4W	0751-2712
R7	R: METAL FILM 100k 2% 1/4W	0751-1042
R8 thru R11	R: METAL FILM 5.11k 1%	0721-5111
R12, R13	R: METAL FILM 10.0k 1%	0721-1002
R14	R: METAL FILM 17.4k 1%	0721-1742
R15	R: METAL FILM 1M 2% 1/4W	0751-1052
R16	R: METAL FILM 10k 2% 1/4W	0751-1032
R17	R: METAL FILM 100k 2% 1/4W	0751-1042
R18	R: METAL FILM 220 2% 1/4W	0751-2212
R19	R: METAL FILM 1k 2% 1/4W	0751-1022

A1 PROCESSOR BOARD DC-4 CONT.

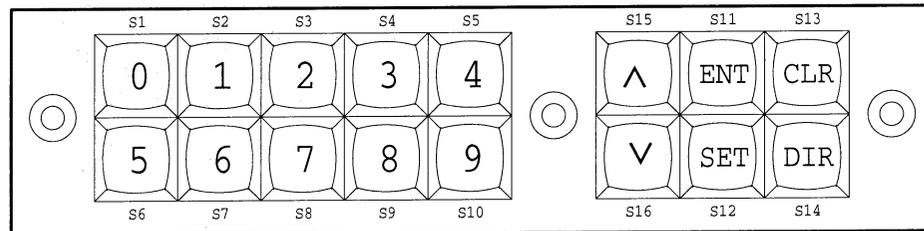
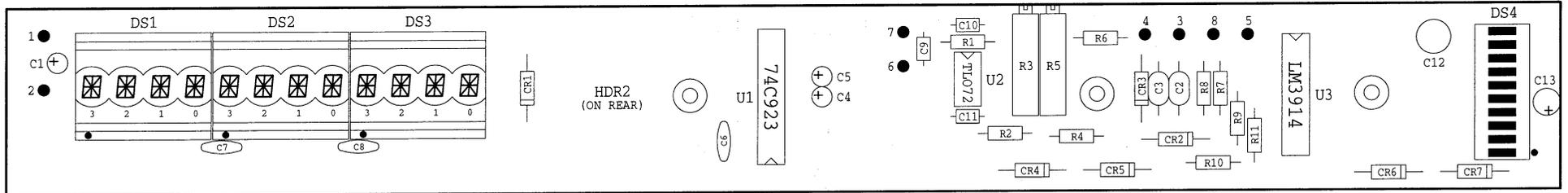
Reference Designation	Description	Part Number
R20,R21	R: METAL FILM 10k 2% 1/4W	0751-1032
R22,R23	R: METAL FILM 47k 2% 1/4W	0751-4732
R24	R: FIXED CARBON 10M 5% 1/4W	0683-1065
R25 thru R28	R: METAL FILM 47k 2% 1/4W	0751-4732
RN1	R: NETWORK 10 PIN 10k	0910-1032
U1	IC: MC12019	1822-0059
U2	IC: 78L05CP	1826-0012
U3	IC: 145158P2	1823-0003
U4,U5	IC: TLO71	1826-0004
U6	IC: 74HC04	1822-0041
U7	IC: MC68HC11E1	1840-0010
U8	IC: MC34064	1826-0048
U9	IC: 74HC139A	1822-0048
U10	IC: 74HC32	1822-0043
U11	IC: 74HC573	1822-0052
U12	IC: DC-4 EPROM	1840-0003G
Y1	XTAL: 8 MHz	0411-0005



DC-4 A2 & A2-1
 REV. A
 DISPLAY BOARDS
 BELAR ELECTRONICS
 6-10-03

PRIOR TO REV. A OF THE A2 BOARD, PIN 5 OF DS1 THRU DS3 WAS CONNECTED TO +5V.

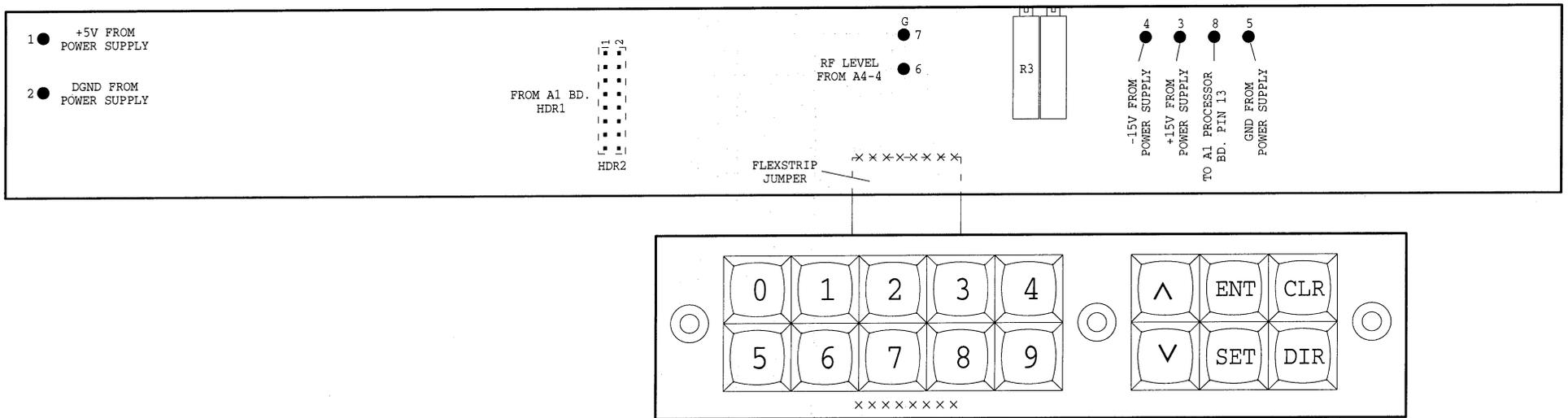
A2 BOARD



A2-1 BOARD

DC-4 A2 & A2-1
 REV. A
 DISPLAY BOARDS
 COMPONENT LAYOUT
 BELAR ELECTRONICS

NOTE: PC BOARDS ARE MARKED "RFA-4 A2 & RFA-4 A2-1"

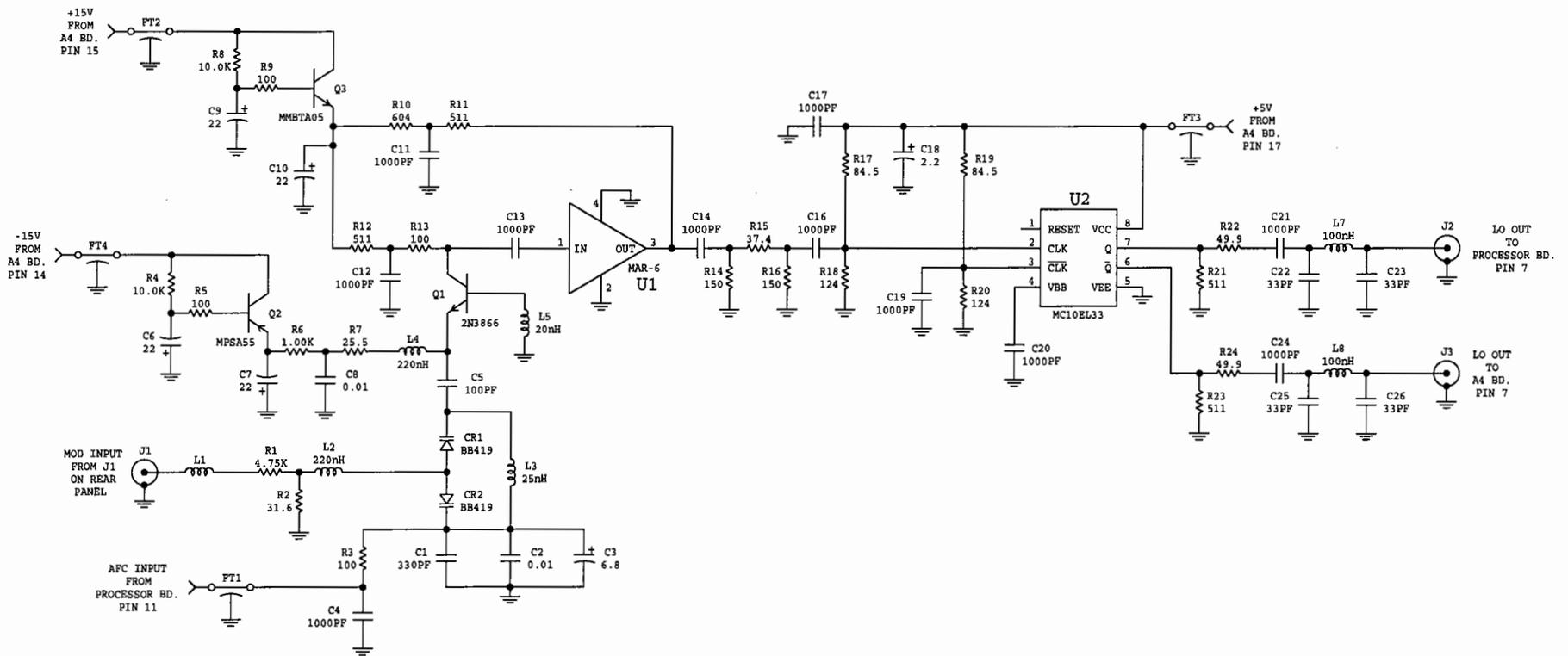


NOTE: PC BOARD IS MARKED "RFA-4 A2"

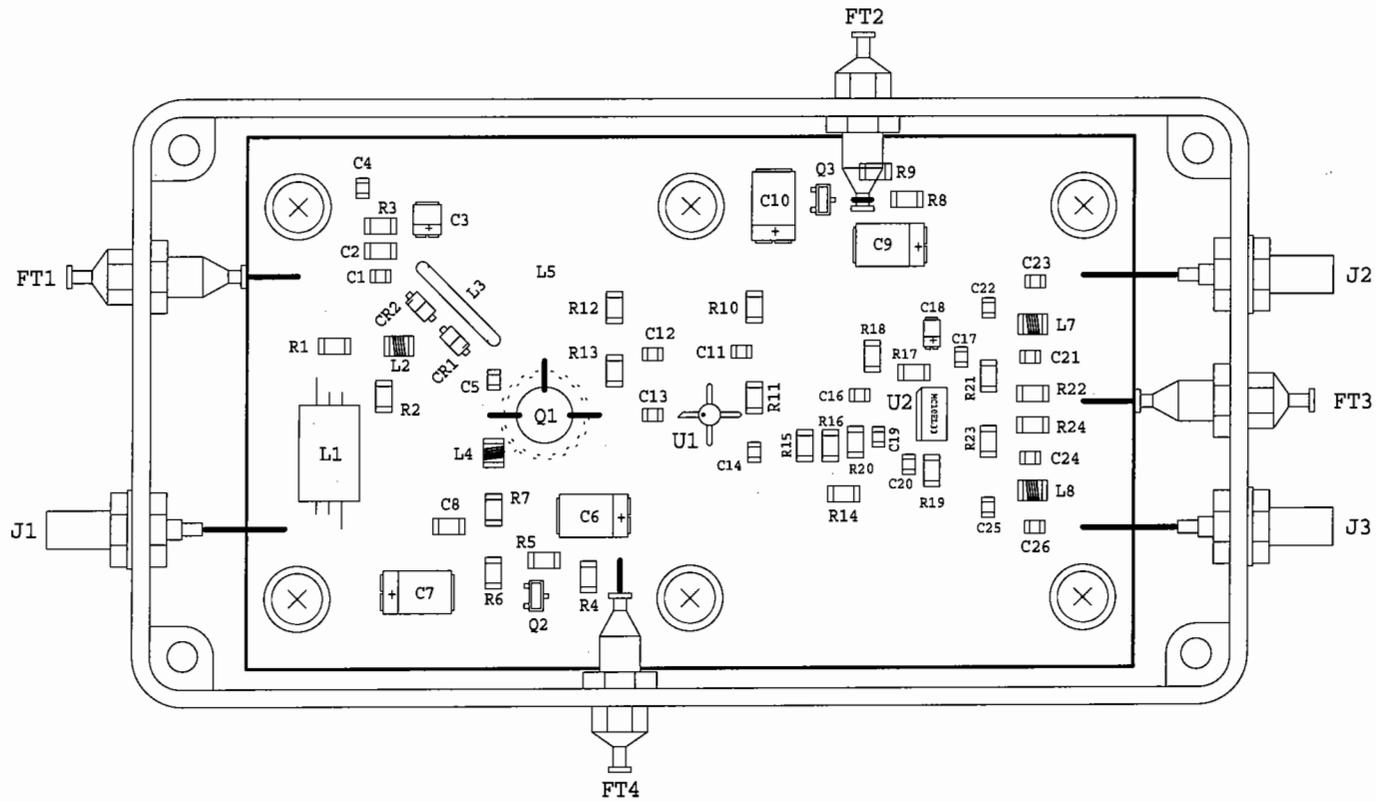
DC-4 A2 DISPLAY BOARD
 REV. A
 CONNECTIONS & ADJUSTMENTS
 BELAR ELECTRONICS

A2 DISPLAY BOARD DC-4, REV. A
 (Note: pc board is marked "RFA-4 A2")

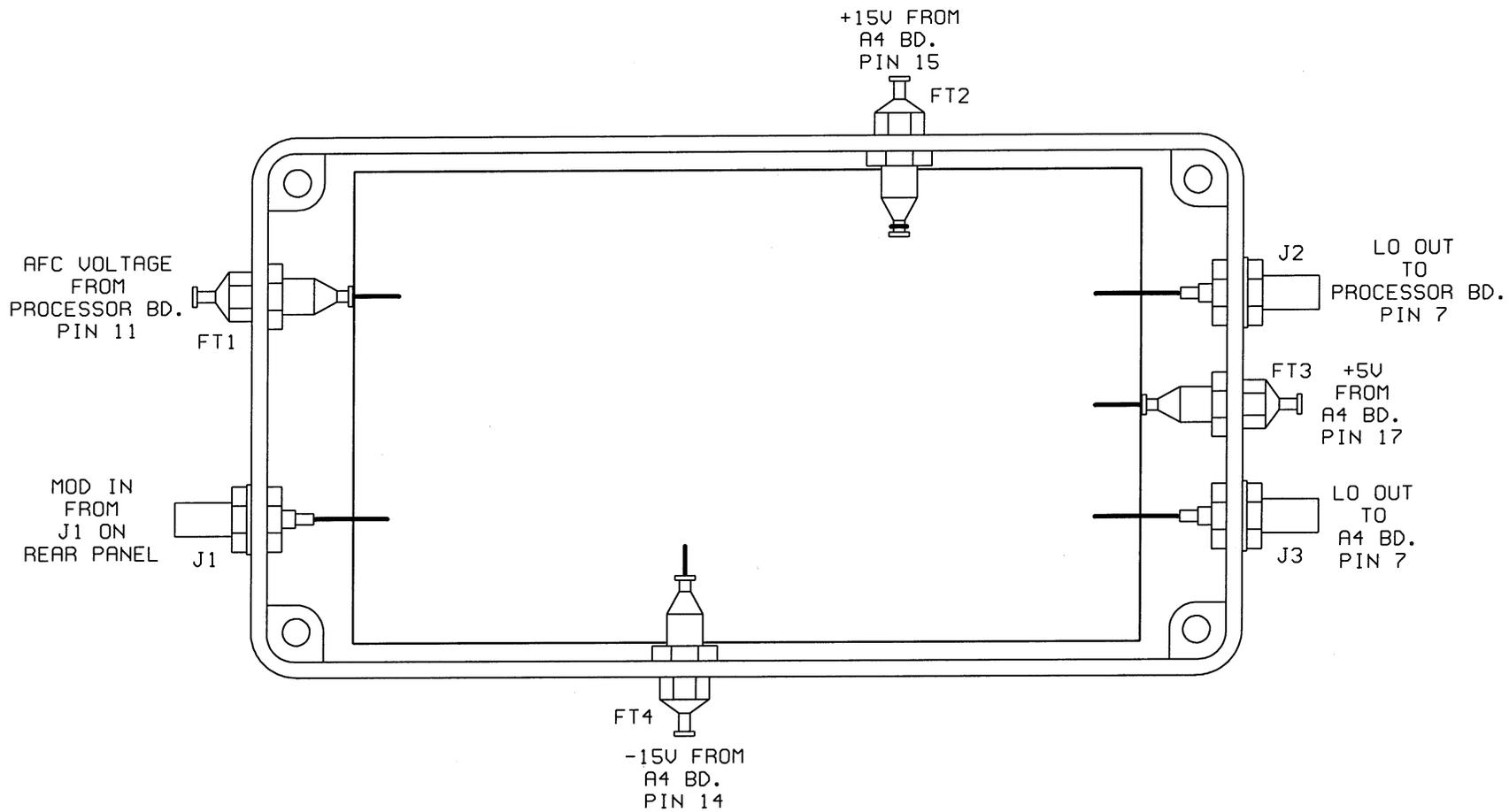
Reference Designation	Description	Part Number
C1	C: FIXED TANT 4.7uF 10V	0185-0001
C2,C3	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C4	C: FIXED TANT 0.47uF 35V	0185-0008
C5	C: FIXED TANT 4.7uF 10V	0185-0001
C6 thru C8	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C9 thru C11	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C12	C: FIXED ELEC 10uF 35V NON-POLAR	0180-0029
C13	C: FIXED TANT 6.8uF 25V	0185-0002
CR1 thru CR7	DIODE: 1N4006	1900-0016
DS1 thru DS3	DISPLAY: HDLO-2416 (prior to rev. A, DS1 thru DS3 were the HPDL2416 display, Belar P/N 1930-0005. These parts are not interchangeable.)	1930-0008
DS4	DISPLAY: HDSP-4830	1930-0006
HDR2	HEADER: 16 PIN	0361-0016
R1	R: METAL FILM 2.21k 1%	0721-2211
R2	R: METAL FILM 2.00k 1%	0721-2001
R3	R: VAR COMP 10k, 10 TURN	2100-0018
R4 thru R6	not used	
R7,R8	R: METAL FILM 2.21k 1%	0721-2211
R9	R: METAL FILM 47k 2% 1/4W	0751-4732
R10	R: METAL FILM 7.5k 2% 1/4W	0751-7522
R11	R: METAL FILM 1.2k 2% 1/4W	0751-1222
S1 thru S16	SWITCH: PUSHBUTTON, MOMENTARY (ON A2-1 BOARD)	3105-0001
U1	IC: 74C923	1823-0006
U2	IC: TLO72	1826-0038
U3	IC: LM3914	1826-0055



DC-4 FM MODULATED VCO
 A1 BOARD
 BELAR ELECTRONICS
 3-1-04



DC-4 FM MODULATED VCO
 A1 BOARD
 COMPONENT LAYOUT
 BELAR ELECTRONICS



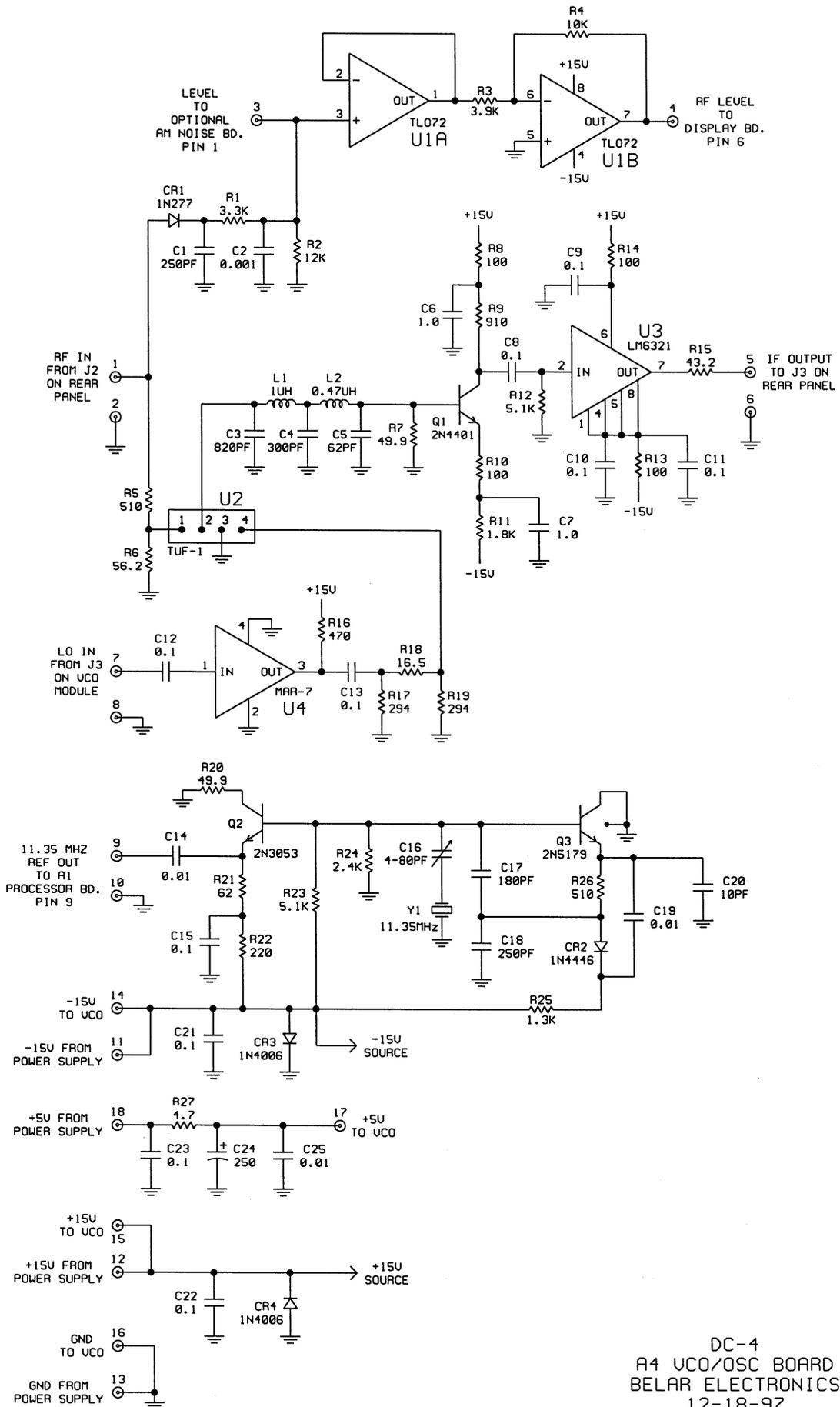
DC-4 FM MODULATED VCO
 A1 BOARD
 CONNECTIONS
 BELAR ELECTRONICS

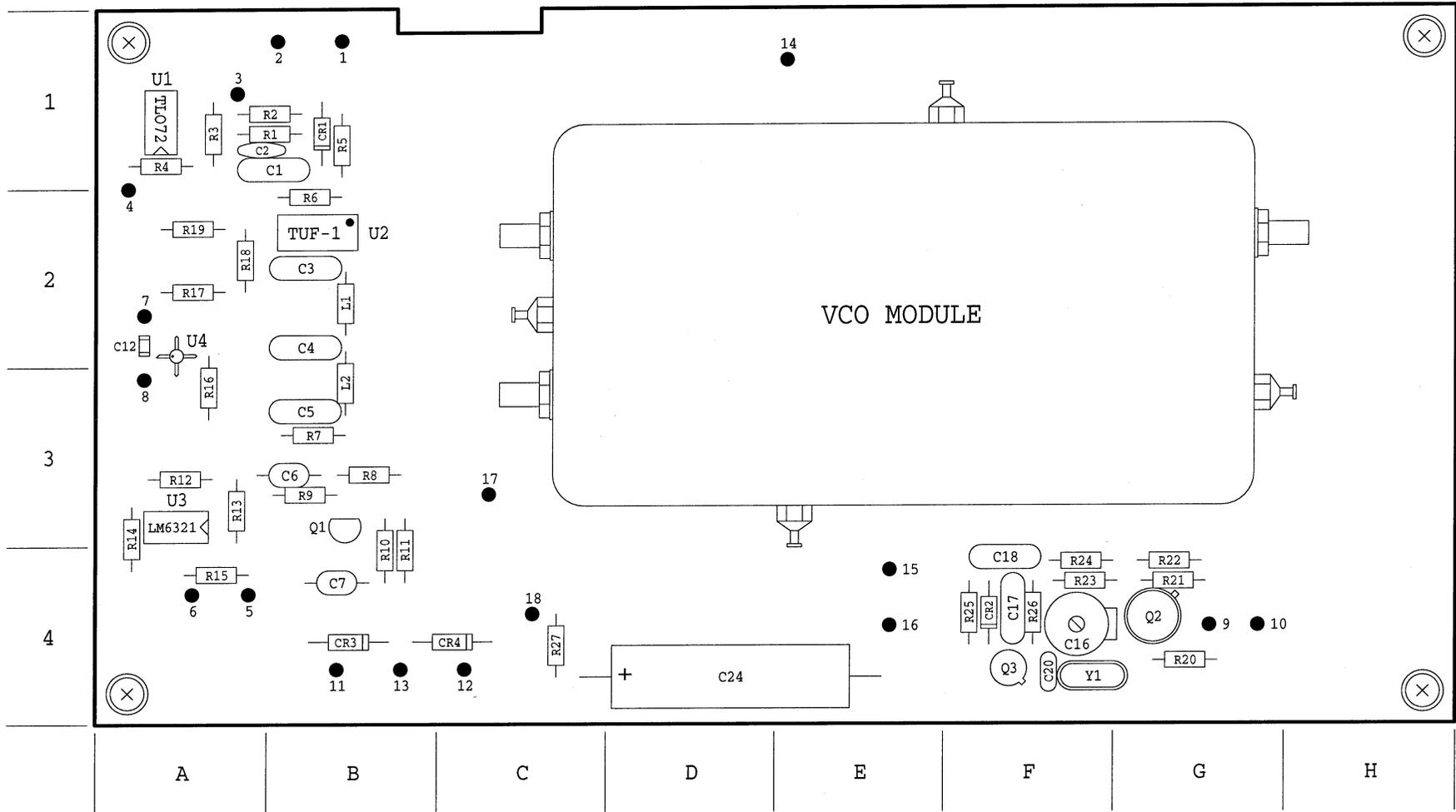
A1 VCO BOARD DC-4

Reference Designation	Description	Part Number
C1	C: FIXED CERAMIC CHIP 330pF 50V	0151-0026
C2	C: FIXED CERAMIC CHIP 0.01uF 50V	0151-0021
C3	C: FIXED TANTALUM CHIP 6.8uF 16V	0185-0031
C4	C: FIXED CERAMIC CHIP 1000pF 50V	0151-0027
C5	C: FIXED CERAMIC CHIP 100pF 50V	0151-0029
C6,C7	C: FIXED TANTALUM CHIP 22uF 25V	0185-0032
C8	C: FIXED CERAMIC CHIP 0.01uF 50V	0151-0021
C9,C10	C: FIXED TANTALUM CHIP 22uF 25V	0185-0032
C11 thru C14	C: FIXED CERAMIC CHIP 1000pF 50V	0151-0027
C15	not used	
C16,C17	C: FIXED CERAMIC CHIP 1000pF 50V	0151-0027
C18	C: FIXED TANTALUM CHIP 2.2uF 16V	0185-0030
C19 thru C21	C: FIXED CERAMIC CHIP 1000pF 50V	0151-0027
C22,C23	C: FIXED CERAMIC CHIP 33pF 50V	0151-0024
C24	C: FIXED CERAMIC CHIP 1000pF 50V	0151-0027
C25,C26	C: FIXED CERAMIC CHIP 33pF 50V	0151-0024
CR1,CR2	DIODE: BB419	1900-0033
FT1 thru FT4	FEED THRU: 1000pF (FT1 thru FT4 are mounted on case)	0121-0012
J1 thru J3	J: SMB, CHASSIS MOUNT (J1 thru J3 are mounted on case)	0360-0041
L1	CHOKE: RF (VK-200-10/3)	9140-0011
L2	CHOKE: CHIP 220nH	9145-0003
L3	CHOKE: 25nH	(Belar)
L4	CHOKE: CHIP 220nH	9145-0003
L5	(distributed inductor)	
L6	not used	
L7,L8	CHOKE: CHIP 100nH	9145-0002
Q1	TRANSISTOR: 2N3866 (selected)	1850-0014
Q2	TRANSISTOR: MPSA55	1850-0101
Q3	TRANSISTOR: MMBTA05	1850-0100
R1	R: METAL FILM CHIP 4.75k 1%	0761-4751
R2	R: METAL FILM CHIP 31.6 1%	0761-31R6
R3	R: METAL FILM CHIP 100 1%	0761-1000
R4	R: METAL FILM CHIP 10.0k 1%	0761-1002
R5	R: METAL FILM CHIP 100 1%	0761-1000
R6	R: METAL FILM CHIP 1.00k 1%	0761-1001
R7	R: METAL FILM CHIP 25.5 1%	0761-25R5
R8	R: METAL FILM CHIP 10.0k 1%	0761-1002
R9	R: METAL FILM CHIP 100 1%	0761-1000
R10	R: METAL FILM CHIP 604 1%	0761-6040

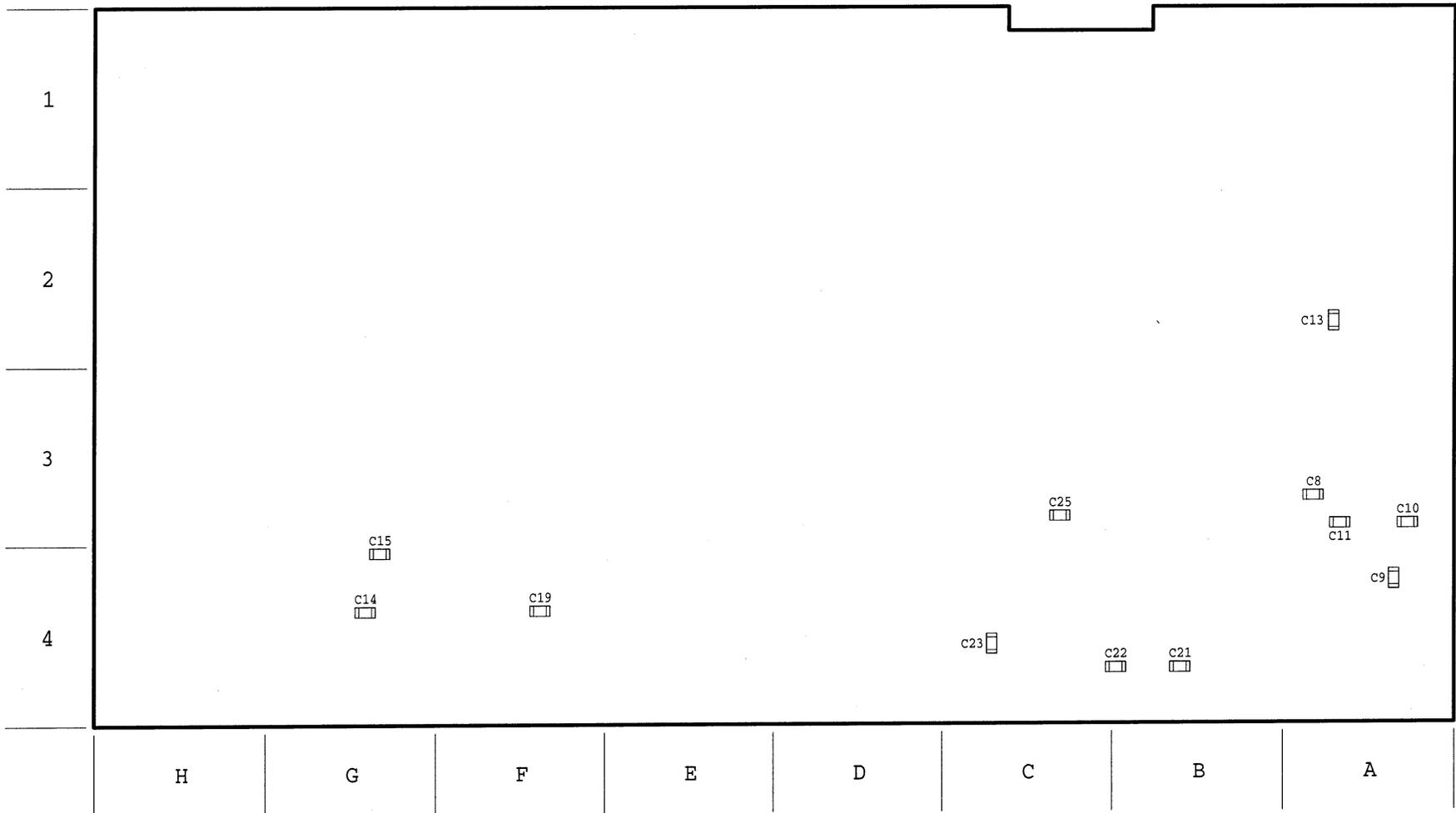
A1 VCO BOARD DC-4 cont.

Reference Designation	Description	Part Number
R11,R12	R: METAL FILM CHIP 511 1%	0761-5110
R13	R: METAL FILM CHIP 100 1%	0761-1000
R14	R: METAL FILM CHIP 150 1%	0761-1500
R15	R: METAL FILM CHIP 37.4 1%	0761-37R4
R16	R: METAL FILM CHIP 150 1%	0761-1500
R17	R: METAL FILM CHIP 84.5 1%	0761-84R5
R18	R: METAL FILM CHIP 124 1%	0761-1240
R19	R: METAL FILM CHIP 84.5 1%	0761-84R5
R20	R: METAL FILM CHIP 124 1%	0761-1240
R21	R: METAL FILM CHIP 511 1%	0761-5110
R22	R: METAL FILM CHIP 49.9 1%	0761-49R9
R23	R: METAL FILM CHIP 511 1%	0761-5110
R24	R: METAL FILM CHIP 49.9 1%	0761-49R9
U1	IC: MAR-6	1845-0026
U2	IC: MC10EL33	1872-0020





DC-4 A4 BOARD
 COMPONENT LAYOUT-TOP
 BELAR ELECTRONICS

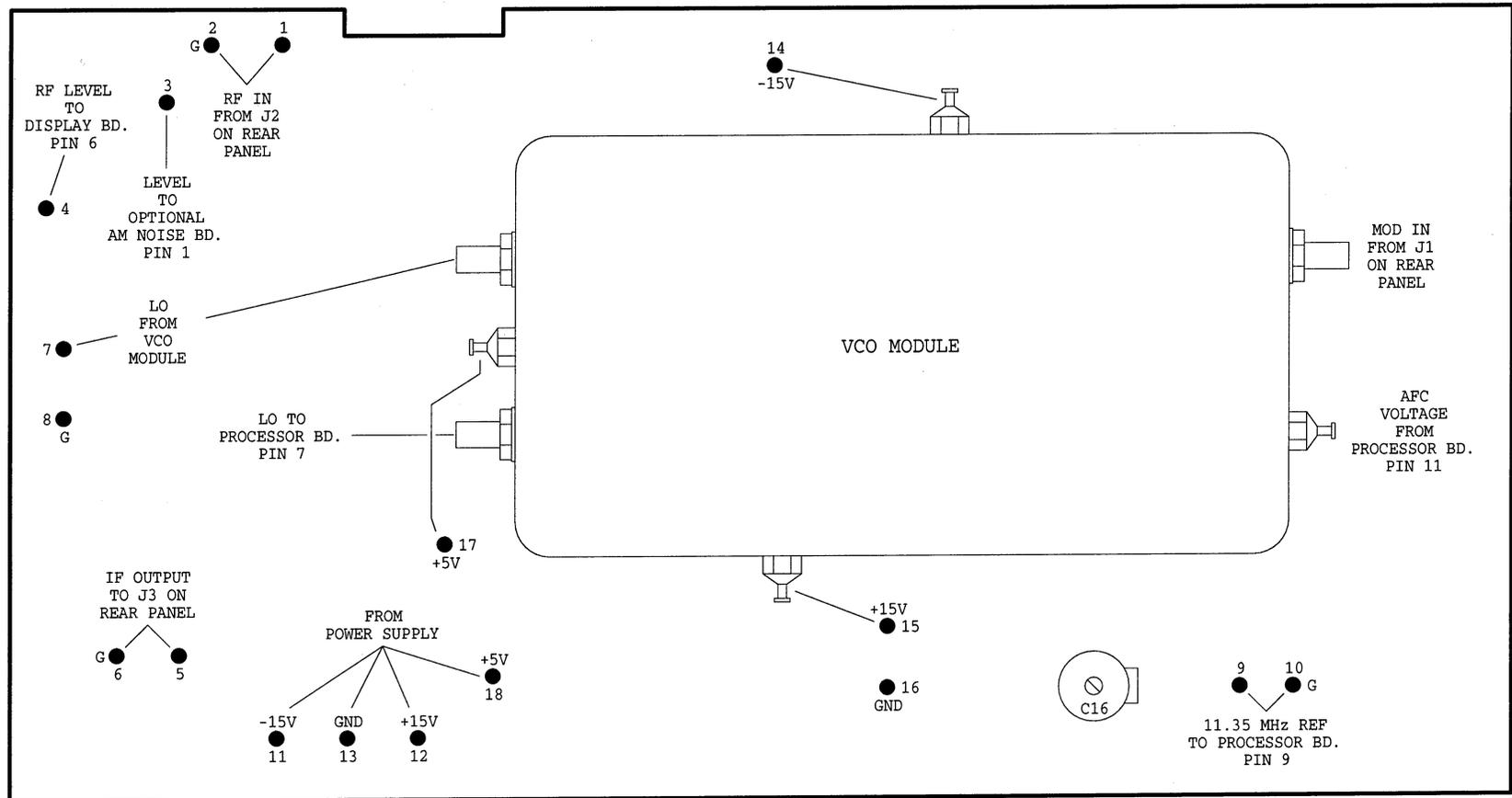


DC-4 A4 BOARD
COMPONENT LAYOUT-BOTTOM
BELAR ELECTRONICS

DC-4 A4 BOARD
PART LOCATIONS

| <u>Desig/Loc</u> |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| C1 B1 | C17 F4 | L2 B3 | R11 B4 | R27 C4 | 6 A4 | | |
| C2 A1 | C18 F4 | | R12 A3 | | 7 A2 | | |
| C3 B2 | C19 F4* | Q1 B3 | R13 A3 | U1 A1 | 8 A3 | | |
| C4 B2 | C20 F4 | Q2 G4 | R14 A3 | U2 B2 | 9 G4 | | |
| C5 B3 | C21 B4* | Q3 F4 | R15 A4 | U3 A3 | 10 G4 | | |
| C6 B3 | C22 B4* | | R16 A3 | U4 A2 | 11 B4 | | |
| C7 B4 | C23 C4* | R1 B1 | R17 A2 | U5 C4 | 12 C4 | | |
| C8 A3* | C24 D4 | R2 B1 | R18 A2 | | 13 B4 | | |
| C9 A4* | C25 C3* | R3 A1 | R19 A2 | Y1 F4 | 14 E1 | | |
| C10 A3* | | R4 A1 | R20 G4 | | 15 E4 | | |
| C11 A3* | CR1 B1 | R5 B1 | R21 G4 | <u>pins</u> | 16 E4 | | |
| C12 A2* | CR2 F4 | R6 B2 | R22 G4 | 1 B1 | 17 C3 | | |
| C13 A2* | CR3 B4 | R7 B3 | R23 F4 | 2 B1 | | | |
| C14 G4* | CR4 C4 | R8 B3 | R24 F4 | 3 A1 | | | |
| C15 G4* | | R9 B3 | R25 F4 | 4 A1 | | | |
| C16 F4 | L1 B2 | R10 B4 | R26 F4 | 5 A4 | | | |

*note: these locations are on bottom of pc board.



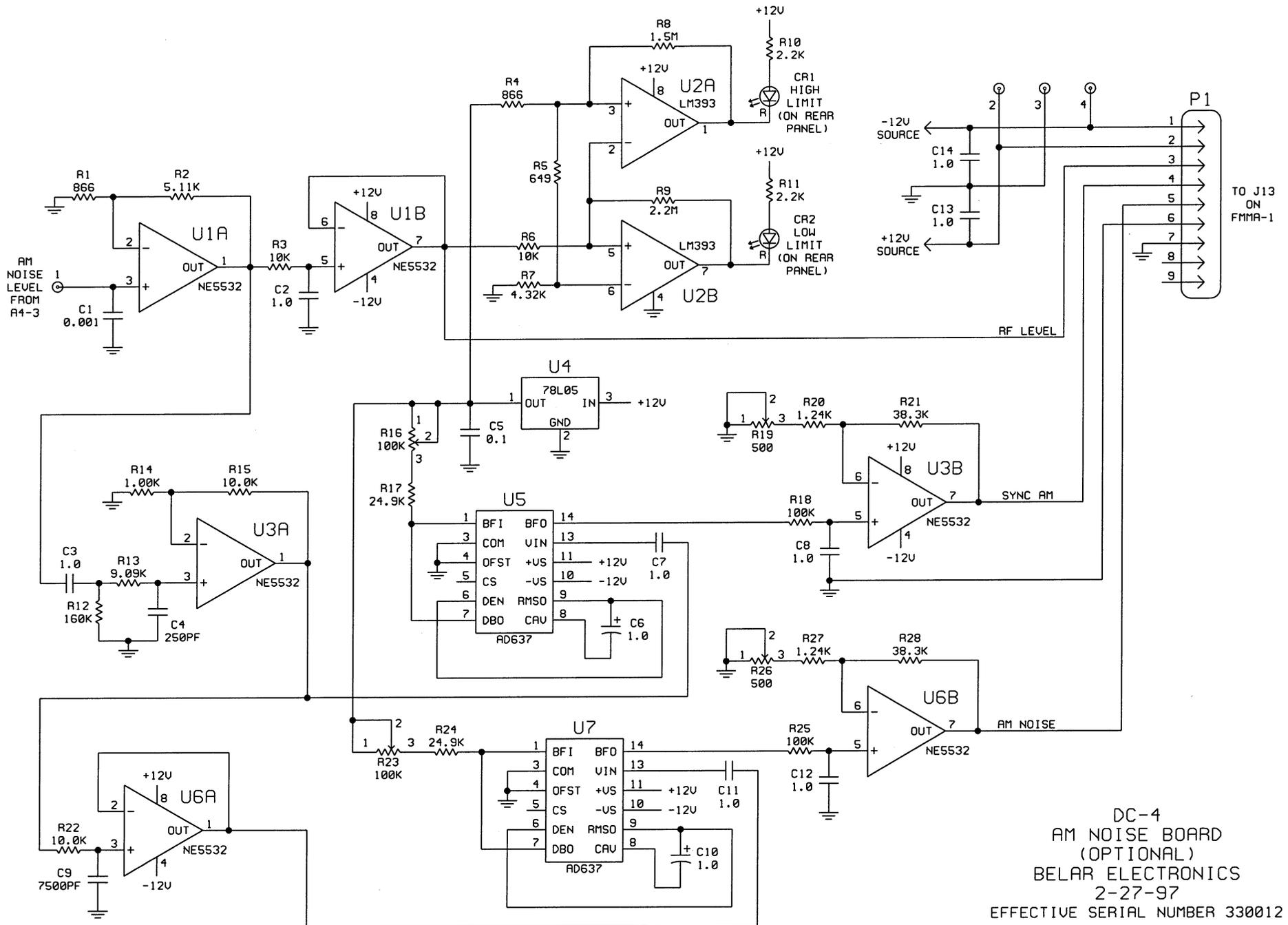
DC-4 A4 BOARD
 CONNECTIONS & ADJUSTMENTS
 BELAR ELECTRONICS

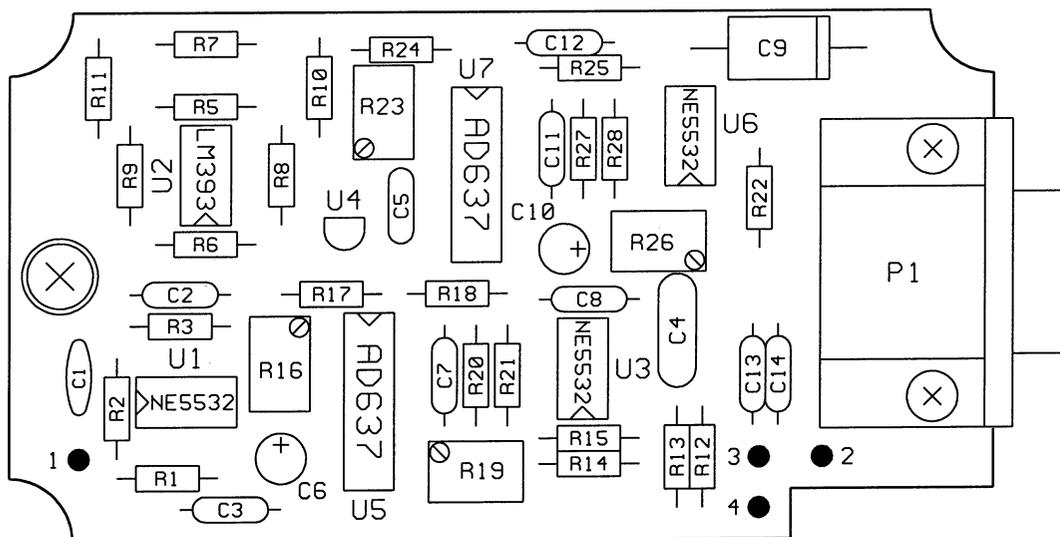
A4 OSCILLATOR BOARD DC-4

Reference Designation	Description	Part Number
C1	C: FIXED MICA 250pF 5%	0140-2515
C2	C: FIXED CERAMIC 0.001uF 1kV	0151-0002
C3	C: FIXED MICA 820pF 5%	0140-8215
C4	C: FIXED MICA 300pF 5%	0140-3015
C5	C: FIXED MICA 62pF 5%	0140-6205
C6, C7	C: FIXED CERAMIC 1.0uF 50V	0151-0016
C8 thru C13	C: FIXED CERAMIC CHIP 0.1uF 50V C1206	0151-0014
C14	C: FIXED CERAMIC CHIP 0.01uF 50V C1206	0151-0021
C15	C: FIXED CERAMIC CHIP 0.1uF 50V C1206	0151-0014
C16	C: VARIABLE MICA 4-80pF	0121-0004
C17	C: FIXED MICA 180pF 5%	0140-1815
C18	C: FIXED MICA 250pF 5%	0140-2515
C19	C: FIXED CERAMIC CHIP 0.01uF 50V C1206	0151-0021
C20	C: FIXED MICA 10pF 5%	0142-1005
C21 thru C23	C: FIXED CERAMIC CHIP 0.1uF 50V C1206	0151-0014
C24	C: FIXED ELEC 250uF 16V	0180-0008
C25	C: FIXED CERAMIC CHIP 0.01uF 50V C1206	0151-0021
CR1	DIODE: 1N277 GERMANIUM	1900-0001
CR2	DIODE: 1N4446	1900-0002
CR3, CR4	DIODE: 1N4006	1900-0016
L1	CHOKER: 1uH	9141-0002
L2	CHOKER: 0.47uH	9141-0006
Q1	TRANSISTOR: 2N4401	1850-0028
Q2	TRANSISTOR: 2N3053	1850-0008
Q3	TRANSISTOR: 2N5179	1850-0023
R1	R: METAL FILM 3.3k 2% 1/4W	0751-3322
R2	R: METAL FILM 12k 2% 1/4W	0751-1232
R3	R: METAL FILM 4.99k 1%	0721-4991
R4	R: METAL FILM 10.0k 1%	0721-1002
R5	R: METAL FILM 510 2% 1/4W	0751-5112
R6	R: METAL FILM 56.2 1%	0721-56R2
R7	R: METAL FILM 49.9 1%	0721-49R9
R8	R: METAL FILM 100 2% 1/4W	0751-1012
R9	R: METAL FILM 910 2% 1/4W	0751-9112
R10	R: METAL FILM 100 2% 1/4W	0751-1012
R11	R: METAL FILM 1.8k 2% 1/4W	0751-1822
R12	R: METAL FILM 5.1k 2% 1/4W	0751-5122
R13, R14	R: METAL FILM 100 2% 1/4W	0751-1012
R15	R: METAL FILM 43.2 1%	0721-43R2
R16	R: METAL FILM 470 2% 1/4W	0751-4712
R17	R: METAL FILM 294 1%	0721-2940
R18	R: METAL FILM 16.5 1%	0721-16R5
R19	R: METAL FILM 294 1%	0721-2940
R20	R: METAL FILM 49.9 1%	0721-49R9
R21	R: METAL FILM 62 2% 1/4W	0751-6202
R22	R: METAL FILM 220 2% 1/4W	0751-2212

A4 OSCILLATOR BOARD DC-4 cont.

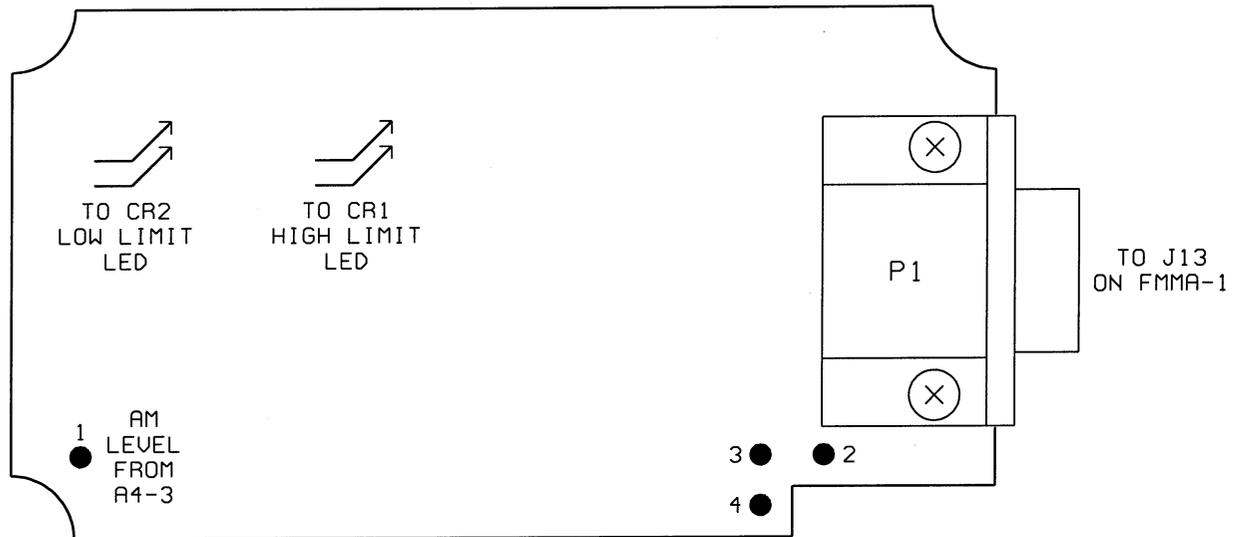
Reference Designation	Description	Part Number
R23	R: METAL FILM 5.1k 2% 1/4W	0751-5122
R24	R: METAL FILM 2.4k 2% 1/4W	0751-2422
R25	R: METAL FILM 1.3k 2% 1/4W	0751-1322
R26	R: METAL FILM 510 2% 1/4W	0751-5112
R27	R: CARB 4.7 5% 1/4W	0683-47G5
U1	IC: TLO72	1826-0038
U2	IC: TUF-1	1845-0011
U3	IC: LM6321	1826-0050
U4	IC: MAR-7	1845-0027
Y1	XTAL: 11.35MHz	0413-1135





NOTE: R4 IS UNDER PC BOARD.

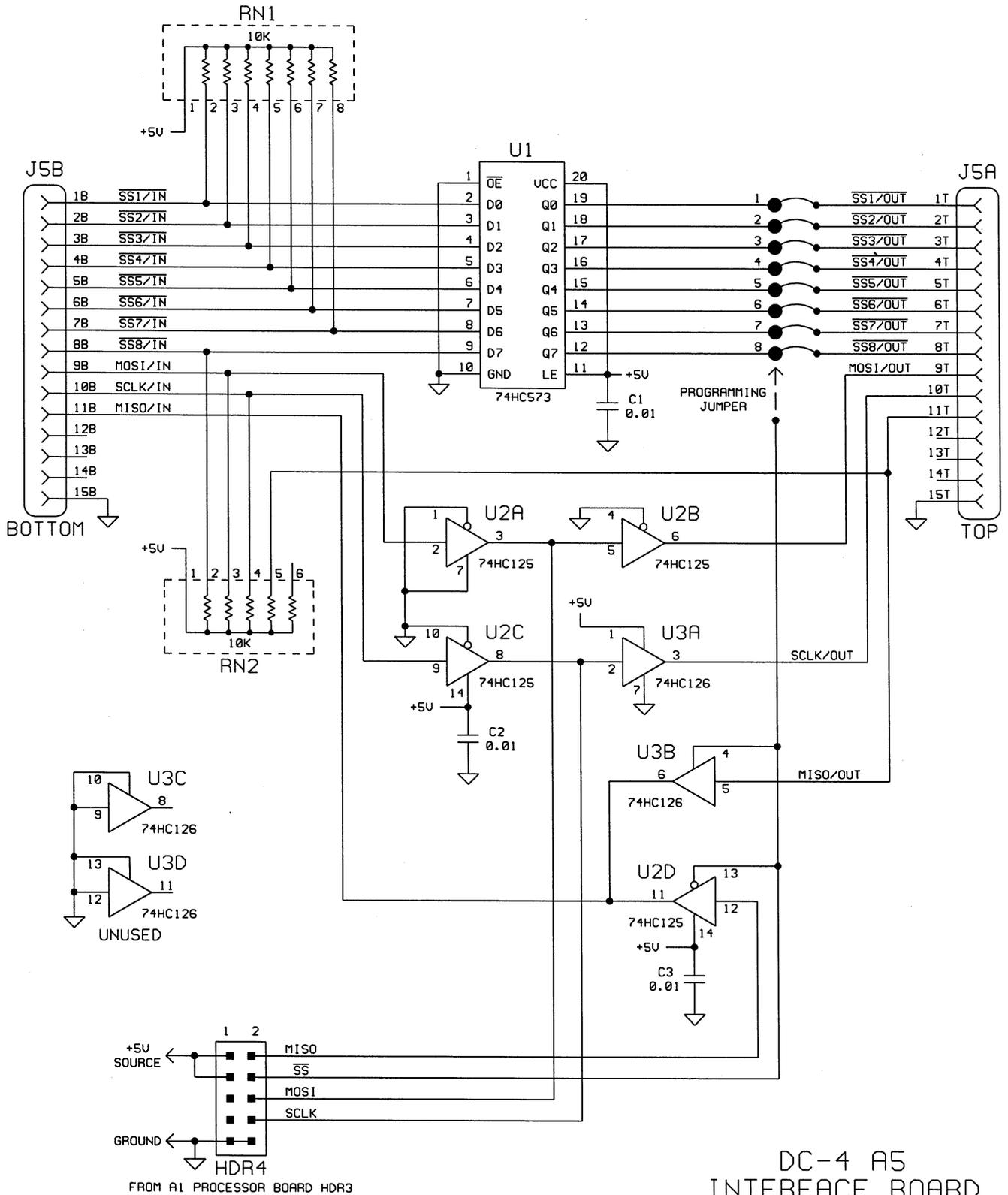
DC-4
 AM NOISE BOARD
 (OPTIONAL)
 COMPONENT LAYOUT
 BELAR ELECTRONICS
 (EFFECTIVE SERIAL NUMBER 330012)



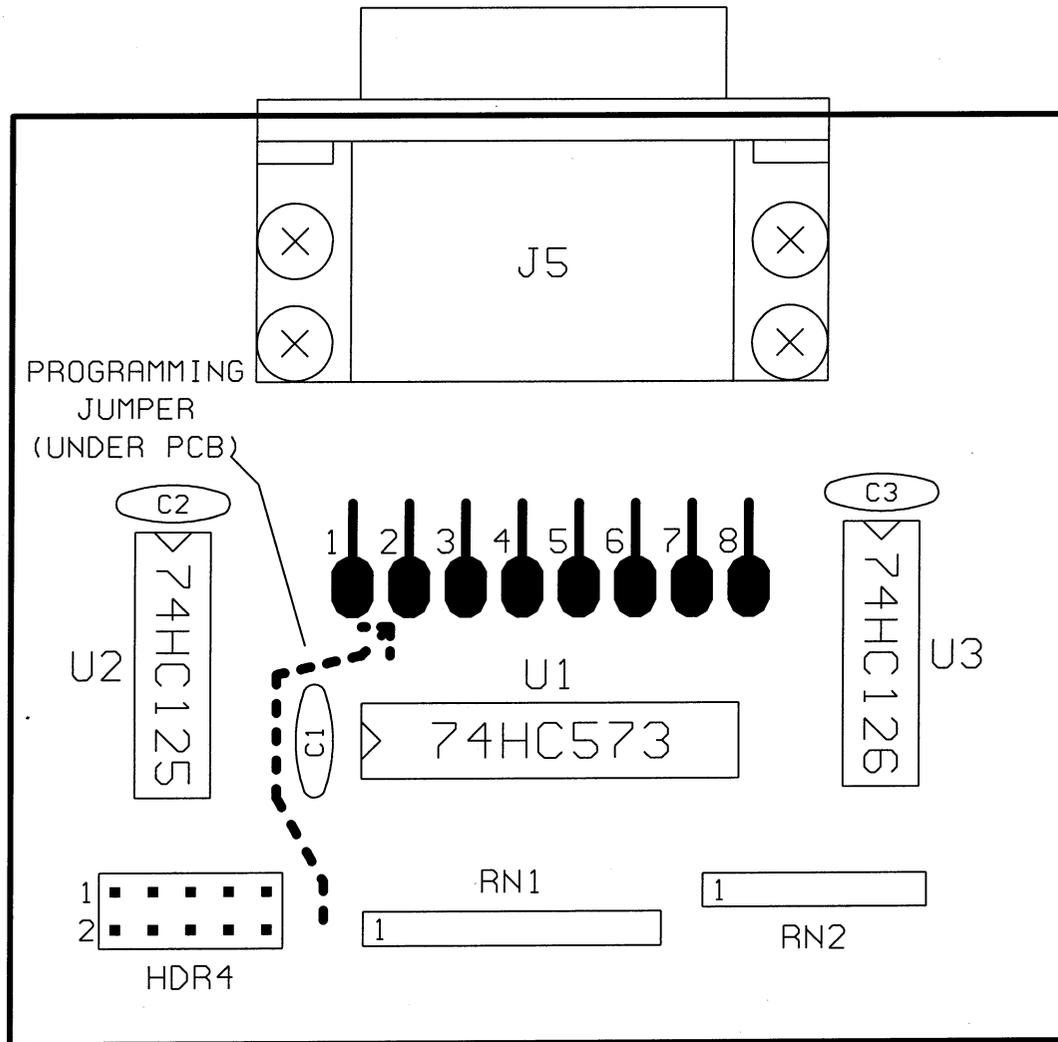
DC-4
AM NOISE BOARD
(OPTIONAL)
CONNECTIONS
BELAR ELECTRONICS

AM NOISE BOARD DC-4 (OPTIONAL)

Reference Designation	Description	Part Number
C1	C: FIXED CERAMIC 0.001uF 1kV	0151-0002
C2,C3	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C4	C: FIXED MICA 250pF 5%	0140-2515
C5	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C6	C: FIXED TANT 1.0uF 35V	0185-0006
C7,C8	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C9	C: FIXED POLY 7500pF 2.5% 160V	0130-7522
C10	C: FIXED TANT 1.0uF 35V	0185-0006
C11 thru C14	C: FIXED CERAMIC 1.0uF 50V	0151-0008
CR1,CR2	LED: RED MV5053 (on rear panel)	1910-0001
P1	CONNECTOR: "D" SINGLE 9 PIN MALE	0360-0036
R1	R: METAL FILM 866 1%	0721-8660
R2	R: METAL FILM 5.11k 1%	0721-5111
R3	R: METAL FILM 10k 2% 1/4W	0751-1032
R4	R: METAL FILM 866 1%	0721-8660
R5	R: METAL FILM 649 1%	0721-6490
R6	R: METAL FILM 10k 2% 1/4W	0751-1032
R7	R: METAL FILM 4.32k 1%	0721-4321
R8	R: FIXED CARBON 1.5M 5% 1/4W	0683-1555
R9	R: FIXED CARBON 2.2M 5% 1/4W	0683-2255
R10,R11	R: METAL FILM 2.2k 2% 1/4W	0751-2222
R12	R: METAL FILM 160k 2% 1/4W	0751-1642
R13	R: METAL FILM 9.09k 1%	0721-9091
R14	R: METAL FILM 1.00k 1%	0721-1001
R15	R: METAL FILM 10.0k 1%	0721-1002
R16	R: VAR COMP 100k, 10 TURN	2100-0030
R17	R: METAL FILM 24.9k 1%	0721-2492
R18	R: METAL FILM 100k 2% 1/4W	0751-1042
R19	R: VAR COMP 500, 10 TURN	2100-0027
R20	R: METAL FILM 1.24k 1%	0721-1241
R21	R: METAL FILM 38.3k 1%	0721-3832
R22	R: METAL FILM 10.0k 1%	0721-1002
R23	R: VAR COMP 100k, 10 TURN	2100-0030
R24	R: METAL FILM 24.9k 1%	0721-2492
R25	R: METAL FILM 100k 2% 1/4W	0751-1042
R26	R: VAR COMP 500, 10 TURN	2100-0027
R27	R: METAL FILM 1.24k 1%	0721-1241
R28	R: METAL FILM 38.3k 1%	0721-3832
U1	IC: NE5532	1826-0037
U2	IC: LM393	1826-0011
U3	IC: NE5532	1826-0037
U4	IC: 78L05CP	1826-0012
U5	IC: AD637	1827-0003
U6	IC: NE5532	1826-0037
U7	IC: AD637	1827-0003



DC-4 A5
 INTERFACE BOARD
 (OPTIONAL)
 BELAR ELECTRONICS
 6-18-96



DC-4 A5 BOARD
(OPTIONAL)
COMPONENT LAYOUT
BELAR ELECTRONICS

A5 BOARD DC-4 (OPTIONAL)

Reference Designation	Description	Part Number
C1 thru C3	C: FIXED CERAMIC 0.01uF 100V	0151-0003
HDR4	HEADER: 10 PIN	0361-0010
J5	CONNECTOR: "D" DUAL 15 PIN	0360-0033
RN1	R: RES NETWORK 6 PIN 10k	0906-1032
RN2	R: RES NETWORK 8 PIN 10k	0908-1032
U1	IC: 74HC573	1822-0052
U2	IC: 74HC125	1822-0045
U3	IC: 74HC126A	1822-0046