

RDS-1

Precision Digital RDS/RBDS Monitor

Guide to Operations

12/00

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1	General Information	1
1-1	General Description	1
1-2	Specifications	1
2	Unpacking	2
2-1	Initial Inspection	2
2-2	Claims	2
2-3	Repacking for Shipment	2
3	Rear Panel	3
4	Installation and Setup	5
4-1	Initial Setup	5
4-2	RS-232 Connection	5
5	Front Panel Operation	6
5-1	Main Menu Selections	7
5-2	DISPLAY BASIC DATA SubMenu Selections	8
5-3	DISPLAY TDC/IH DATA SubMenu Selections	9
5-4	DISPLAY PAGING DATA SubMenu Selections	9
5-5	DISPLAY GROUP DATA SubMenu Selections	9
5-6	MODIFY SETTINGS SubMenu	10
6	Running the Setup Program	11
6-1	Main Setup Menu Selections	11
6-2	MODIFY OPTIONS SubMenu Selections	12
6-3	MODIFY ID SubMenu Selections	12
6-4	MODIFY RELAYS SubMenu Selections	13
6-5	UNIT INFO SubMenu Selections	13
6-6	TEST RELAY SubMenu Selections	14
6-7	TEST RS-232 SubMenu Selections	14
7	Remote Communications with the RDS-1	14
8	Diagrams, Schematics and Parts Lists	15

Appendix A: Using The Wizard Software

RDS-1 Precision RDS/RBDS Monitor

1 General Information

1-1 General Description

The Belar RDS-1 is a full-featured RDS/RBDS monitor and decoder that incorporates both the RBDS standard used in the U.S. and the RDS standard used in European and other countries. The RDS-1 is essential to monitor critical RDS parameters, such as RDS injection and the phase relationship between the RDS subcarrier and the stereo pilot. The RDS-1 decodes all the major group types and provides the data in fully decoded and hexadecimal formats. An RS-232 interface and a Wizard interface are built into the RDS-1 for easy remote communication and full-screen displays.

Parameters Measured:

- Total Modulation
- RDS Injection
- RDS Phase Error
- Pilot Injection
- Block Error Rate
- Basic RDS Data - including PI, PS, PTY, TP, TA, M/S, DI, AF, ECC, PIN, Radio Text A & B, Location (State, City, Grid), Time, Date, and Group Types being transmitted.
- Transparent Data Channels (0-31)
- In-House Data Channels (0-31)
- Paging Information - including MMBS Detection, Network Group, Paging Interval, and Radio Paging Data (Group Code, BCD Pager ID, type of page, and text of page).
- Group Data (Hexadecimal and ASCII for all groups).

1-2 Specifications

Total Modulation Display Range 0-127% in 1% increments
RDS Injection Measurement Range 0-12.7% in 0.1% increments
RDS Phase Measurement Range ± 30 degrees in 1 degree increments
Pilot Injection Measurement Range 0-12.7% in 0.1% increments

Input 100 k Ω , unbalanced, BNC connector, 1.0 - 2.0 Vrms (2.8 V - 5.7 Vp-p), Composite

RDS Data Output unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source
RDS Clock Output unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source
Regenerated 57 kHz Output unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source
Regenerated 19 kHz Output unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source
Pilot Output unbalanced, BNC connector, 2 Vp-p @ 9.0%, 500 Ω source
Subcarrier Output unbalanced, BNC connector, 2 Vp-p @ 5.0%, 500 Ω source

Remote Outputs Programmable Relay Closures for Pilot, RDS, Sync, PTY30 or PTY31 presence

The Wizard System

Serial Interface	RS-232
Unit Interface	Wizard Standard Interface
Dimensions	1 EIA Rack Unit, 1.75" H x 12" D x 19" W
Power Requirements	100-240 Vac, 50-60 Hz, 10 Watts
Shipping Weight	10 lbs (4.5 kgs)

2 Unpacking

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 and 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 *Section 2-2* for the recommended claim procedure. Keep all packing material for proof of claim or for possible future use.

The RDS-1 is shipped with a Guide to Operations, 4 black rack-mount screws with cup washers, a BNC jumper, and a three-wire line 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.

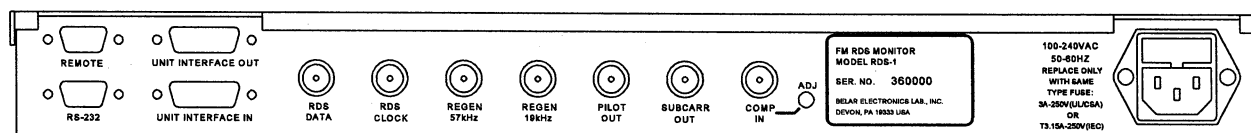
2-3 Repacking for Shipment

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, Belar can provide a replacement box and packaging at a nominal cost. Alternatively, 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.

RDS-1 Precision RDS/RBDS Monitor

3 Rear Panel

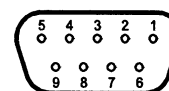


COMP IN	Composite Input, 100 k Ω , unbalanced, BNC connector, 1.0 - 2.0 Vrms (2.8V - 5.7 Vp-p).
SUBCARR OUT	RDS Subcarrier Output, unbalanced, BNC connector, 2 Vp-p @ 5.0%, 500 Ω source. This output is the RDS subcarrier signal fed to the RDS decoder after the 57 kHz BPF has been applied.
PILOT OUT	19 kHz Pilot Output, unbalanced, BNC connector, 2 Vp-p @ 9.0%, 500 Ω source. This output is the 19 kHz BP filtered pilot used to calculate the pilot injection and also as a feed to the 19 kHz regeneration PLL.
REGEN 19KHZ	Regenerated 19 kHz Output, unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source. This square wave output signal is phase locked to the incoming pilot. It is used as the pilot phase reference for the RDS subcarrier phase error measurement.
REGEN 57KHZ	Regenerated 57 kHz Output, unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source. This square wave output signal is phase locked to the incoming RDS subcarrier. It is used as the RDS subcarrier phase reference along with the regenerated 19 kHz pilot to determine the RDS subcarrier phase error.
RDS CLOCK	RDS Clock Output, unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source. This square wave output signal is the 1187.5 kHz bit clock used to decode the RDS data bit stream.
RDS DATA	RDS Data Output, unbalanced, BNC connector, 0-5 Vp-p, HCMOS, 1 k Ω source. This digital bit stream represents the RDS data. When used in conjunction with the RDS clock, the incoming RDS data may be analyzed by an extra decoder.
UNIT INTERFACE IN	15 pin female D connector. This interface is used to connect to other units in The Wizard System for unified remote operation. Note that when the RDS-1 is connected to another Wizard System unit, such as the Belar FMMA-1, the HOLD TIME on <i>all but one</i> of the units in the chain should be set to EXT so all the units will be synchronized.
UNIT INTERFACE OUT	15 pin female D connector. This interface is used to connect other Wizard-interface-equipped equipment, such as the Belar FMMA-1 to the RDS-1 for combined remote operation. The interface works in a daisy-chain configuration, with the first unit (say, the FMMA-1) at the start of the chain, with its Unit Interface Out connected to the Unit Interface In on the next unit (say, the FMMA-1). The Unit Interface Out of the FMMA-1 is then connected to the Unit Interface In of the RDS-1, and so forth.

The Wizard System

REMOTE

9 pin female D connector. Provides programmable relay contact pair activation for PILOT, RDS, SYNC, PTY30, or PTY31 presence. See *Section 6-4 MODIFY RELAYS* for programming and operational information.



Remote
connector

The pinout of this connector is as follows:

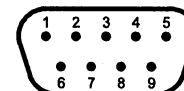
Pin 1	Relay # 0 contact
Pin 2	Relay # 0 contact
Pin 3	Relay # 1 contact
Pin 4	Relay # 1 contact
Pin 5	Relay # 2 contact
Pin 6	Relay # 2 contact
Pin 7	not used
Pin 8	not used
Pin 9	not used

(Note: relays are rated at 10 W max, 0.5 A max, 200 Vdc max)

RS-232

This 9 pin male D connector is provided for direct communication between the RDS-1 and an IBM-compatible computer using the Wizard Software. If you intend to write software to directly communicate with the RDS-1 using this port, please refer to *Section 7*.

<u>Pin</u>	<u>Type</u>		<u>Description</u>
1	input	CD	Carrier detect from Modem
2	input	Rx	Receive data
3	output	Tx	Transmit data
4	output	DTR	Data terminal ready
5	ground	GND	signal ground
6-9			not used



RS-232
connector

RDS-1 Precision RDS/RBDS Monitor

4 Installation and Setup

The RDS-1 is designed to be mounted in a standard 19 inch electronic equipment rack with EIA standard spacing. When the monitor is mounted above equipment generating large amounts of heat, such as power supplies and amplifiers, provisions must be made to insure the free movement of cool air around the RDS-1. In no instance should the ambient chassis temperature be allowed to rise above 50°C (122°F). Mount the unit to the rack using the four black 10-32 rack-mounting screws provided.

The RDS-1 uses a switching power supply that accepts line voltages in the range of 100–240 VAC, 50–60 Hz. No adjustment is necessary as long as the line voltage falls within these ranges. The fuse in the rear panel AC input module should only be a type 3A–250 V (UL/CSA) fuse or a type T3.15A–250 V (IEC) fuse. A spare fuse is stored in the removable fuse compartment in the module.

The rear panel AC power entry module conforms to the IEC-320 standard and accepts a PH-386 grounded AC connector. The RDS-1 is supplied with a three-conductor power cord with a PH-386 female connector on one end and a type PH-290B male connector on the other end for standard 115 Vac operation. If 230 Vac operation is specified, the male connector is a type PH-44C. When the power cord is plugged into an appropriate AC outlet, the unit is grounded. (The offset pin on the power cable's three-prong connector is the ground contact.) To preserve the grounding feature when operating the unit from a two-contact outlet, use a three-prong-to-two-prong adaptor and connect the green pigtail on the adaptor to a good electrical ground.

The RDS-1 does not have an internal power switch. When the power cord is attached, the unit is operating.

4-1 Initial Setup

COMPOSITE INPUT Connect the composite output of your FMMA-1, FMM-2, or other wideband FM demodulator to the Composite Input jack on the RDS-1 rear panel. Apply an appropriate calibration signal to the unit (for example, the Belar FMMA-1 or FMM-2 with its internal calibrator turned on). Adjust the potentiometer labeled "ADJ" located on the back panel until the TOTAL display on the front panel (in the MENU/PARAMETER window) reads 100%.

4-2 RS-232 Connection

This male 9-pin D type RS-232 connector is provided for direct communication between the RDS-1 and an IBM-compatible computer using the Wizard Software.

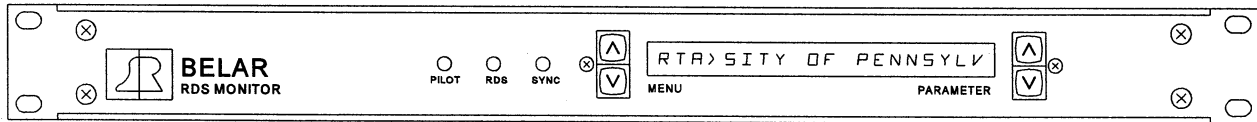
This method of RDS-1 to computer communication may be accomplished with a direct connection (on-site) or from any distance via a telephone/modem connection.

Refer to *Appendix A: Using The Wizard Software* at the rear of this manual for information on the RDS-1 to computer connections and information on the use of a modem. The connection instructions apply to both communication methods mentioned.

Once connection is complete, if The Wizard Software is being used, refer to the Appendix for instructions on starting the software.

The Wizard System

5 Front Panel Operation



The green **PILOT** LED is illuminated when the unit detects the 19 kHz pilot. At least 6% injection is required to illuminate this light.

The green **RDS** LED is illuminated when the unit detects the 57 kHz subcarrier. At least 0.5% injection is required to illuminate this light.

The yellow **SYNC** LED is illuminated when the unit locks to the RDS data stream.

Note: During normal operation the RDS and SYNC LEDs should be operating at all times.

The **MENU/PARAMETER WINDOW** is a 20 character alphanumeric display that shows menu selections and associated parameters or measurements.

To the left of the Menu/Parameter Window, the **UP** and **DOWN MENU** buttons are used to scroll through the various menu selections of the RDS-1. The menu selections consist of a main outer loop and five submenu loops. Either the UP or DOWN button will get you to your menu choice; but usually one direction will get you there quicker than the other.

To the right of the Menu/Parameter Window, the **UP** and **DOWN PARAMETER** buttons are used to scroll through the available readings or settings for a given menu selection, where applicable.

The outer loop consists of all the measurements the RDS-1 can make, as well as the submenu displays DISPLAY BASIC DATA, DISPLAY TDC/IH DATA, DISPLAY PAGING DATA, DISPLAY GROUP DATA, and MODIFY SETTINGS.

Any of the five submenu loops is accessed by pressing the UP PARAMETER button when the submenu loop you want to enter is showing in the MENU/PARAMETER window.

The four "DISPLAY . . ." submenu loops display various types of RDS data. The MODIFY SETTINGS submenu loop consists of all the settable parameters in the unit, such as hold time, time mode, etc. These submenus are explained in *Section 5-2* thru *Section 5-6*.

RDS-1 Precision RDS/RBDS Monitor

5-1 Main Menu Selections

Below is a summary of all the main menu selections available on the RDS-1.

TOTAL XXX %	Displays total peak modulation expressed in percent. The range is 0-127%.
RDS INJ XX.X %	Displays RDS injection to 0.1 percent. The range is 0-12.7%.
RDS PH XXX DEG	Displays the phase error of the 57 kHz subcarrier with respect to the stereo pilot, in degrees. The range is 0-30 degrees positive or negative. When the phase error is more than 30 degrees, a "+XX" or "-XX" will appear, indicating an off scale measurement. Your RDS Encoder should have a phase adjustment, and should be adjusted so that this reading is 0 degrees.
PILOT INJ XX.X %	Displays the Pilot Injection in percent. The range is from 0% to 12.7% in 0.1% increments.
BLK ERROR XX.X%	Displays the block error rate of the RDS data.
DISPLAY BASIC DATA	This selection is the gateway to entering the basic RDS Data submenu loop (PI code, radio text, etc). Press the UP PARAMETER arrow here to access the Basic Data menus, as described in <i>Section 5-2</i> .
DISPLAY TDC/IH DATA	This selection is the gateway to entering the Transparent Data Channel (TDC) and In-House Data submenu loop. Press the UP PARAMETER arrow here to access the TDC/IH Data menus, as described in <i>Section 5-3</i> .
DISPLAY PAGING DATA	This selection is the gateway to entering the Paging Data submenu loop. Press the UP PARAMETER arrow here to access the Paging Data menus, as described in <i>Section 5-4</i> .
DISPLAY GROUP DATA	This selection is the gateway to entering the Group Data submenu loop. Press the UP PARAMETER arrow here to access the Group Data menus, as described in <i>Section 5-5</i> .
MODIFY SETTINGS	This selection is the gateway to entering the Modify Settings submenu loop. Press the UP PARAMETER arrow here to access the Modify Settings menus, as described in <i>Section 5-6</i> .

The Wizard System

5-2 DISPLAY BASIC DATA SubMenu Selections

PI:	Displays the Program Identification in hexadecimal and decoded call letters.
PS:	Displays the Program Service name (8 characters).
PTY<XX>: XXXX PTY 10A:	Displays the Program Type code and decoded text. Press the UP PARAMETER arrow to display Group 10A user defined PTY Name.
TP - OFF<0>/ON<1>	Indicates the state of the Traffic Program Identification indicator (ON/OFF).
AF<XX>	Shows Alternate Frequency information. The number of alternate frequencies appear in the parentheses (e.g. AF <4>) and the alternate frequencies themselves scroll across the display.
LN:STATE <--> -- LN:CITY ----- LN:GRID ----	Shows Location/Navigation information. Press the UP PARAMETER arrow to cycle between the STATE, CITY, and GRID identifiers.
TA - OFF <0>/ON<1>	Indicates the state of the Traffic Announcement indicator (ON/OFF).
DI<XX>: XXXXX	Shows the Decoder Identification (STEREO, etc.)
M/S - XXXXXX<X>	Displays the state of the MUSIC<1>/SPEECH<0> indicator.
PIN -- --:--	Displays the Program Item Number and scheduled Day and Month.
RTA< RTB< ATX< BTX<	Displays Radio Text (type A or type B), which will scroll across the display. The left of the display will show "RTA)" or "RTB)", depending on what type of radio text is being transmitted. Pressing the UP PARAMETER button will change the legend to "ATX)" or "BTX)", which limits the display to Type A or Type B only.
ECC XX	Shows the Extended Country Code (if any) being transmitted.
CT:TIME --:-- -- CT:DATE --/--/--	Displays the local time and date information. (The RDS-1 automatically computes the local time and date from the Universal Coordinated Time and Local Offset you entered when you set up your encoder.) Press the UP PARAMETER arrow to cycle between the TIME and DATE identifiers.
GT<	Displays the Group Types being transmitted.
EXIT ?	Press the UP PARAMETER arrow to return to the main menu.

RDS-1 Precision RDS/RBDS Monitor

5-3 DISPLAY TDC/IH DATA SubMenu Selections

- TDC<XX>:-----** Displays the data being transmitted over the Transparent Data Channels. Press the UP or DOWN PARAMETER arrow to cycle through the 32 data channels (0-31).
- IH<XX>:-----** Displays the data being transmitted over the In-House Data Channels. Press the UP or DOWN PARAMETER arrow to cycle through the 32 data channels (0-31).
- EXIT ?** Press the UP PARAMETER button to return to the main menu.

5-4 DISPLAY PAGING DATA SubMenu Selections

- MMBS DETECTED - YES/NO** Indicates if the RDS-1 has detected MMBS paging. The monitor does not decode MMBS, but will detect if it is present.
- NET GRP<X>:** Displays the Network Group designation.
- INTERVAL<X,Y,Z>: N** Displays the Paging Interval (0-9). The "X" position displays the 1A number within the interval being transmitted (1-6), and the "Y" and "Z" positions display bits 0 and 1 of Group 1A, block 2.
- RP0> thru RP4>** Displays the Radio Paging Data. The Group Code (00-99), 4-digit BCD pager ID, and type of page (10-digit, Alpha, etc.) appear in this display. Press the UP PARAMETER arrow to display the text of the page. Pressing the UP MENU button will cycle to the next message (the RDS-1 stores 5 messages, numbered 0-4, in its buffers).
- EXIT ?** Press the UP PARAMETER arrow to return to the main menu.

5-5 DISPLAY GROUP DATA SubMenu Selections

- 0A 1:XXXX 2:XXXX**
0A 3:XXXX 4:XXXX
0A ASCII: XXXXXXXX
0B 1:XXXX 2:XXXX
0B 3:XXXX 4:XXXX
0B ASCII: XXXXXXXX
thru
15A 1:XXXX 2:XXXX
15A 3:XXXX 4:XXXX
15A ASCII: XXXXXXXX
15B 1:XXXX 2:XXXX
15B 3:XXXX 4:XXXX
15B ASCII: XXXXXXXX
- EXIT ?** Press the UP PARAMETER arrow to return to the main menu.

The Wizard System

5-6 MODIFY SETTINGS SubMenu Selections

HOLD XX.X SEC

HOLD - EXT

Determines the time interval over which Total modulation readings are held and/or acquired. When in PAST TIME MODE, the unit waits the HOLD time and displays the highest peak in that interval. In REAL TIME MODE, the hold time represents the length of time the current peak is held on the display, unless a new higher peak is detected. If a new higher peak is detected before the hold time has expired, the new peak is immediately displayed and the hold time clock restarted. (NOTE: this only affects the Total modulation display. All other displays are updated once each second.)

The HOLD time may be set in 0.5 second intervals from 0.5 to 10.0 seconds. In PAST TIME MODE, the additional HOLD-EXT setting allows the RDS-1 display to be externally synchronized with other units in the Wizard system.

TIME MODE - REAL/PAST

Determines the mode in which Total modulation peaks are displayed. In REAL time mode the Total modulation display is updated as soon as a new peak is detected. In PAST time mode the unit waits the HOLD time and displays the highest peak which occurred during this HOLD interval. This only affects the Total modulation display.

INFINITE - ON/OFF

Enables or disables infinite hold of display. If infinite hold is enabled, the Total modulation display acts as a "high water mark" and will "stick" at the highest modulation (until infinite hold is turned off). (NOTE: this only affects the Total modulation display -- all other displays are updated once per second.)

REMOTE - ON/OFF

Enables or disables the RS-232 port. This allows users to enable or block remote access to the unit through the RS-232 port. Remote cannot be turned off while the unit is in remote mode (someone is communicating remotely). Remote also cannot be turned off remotely. Note that this does not affect communication through the UNIT INTERFACE. Access to the unit interface is controlled through access to The Wizard (see the FMMA-1 Wizard instruction book for more information.)

SAVE CONFIG

Allows user to save all parameters to internal EEPROM so that the unit configuration is preserved when power is removed. Press the UP PARAMETER to save the configuration.

EXIT ?

Press the UP PARAMETER arrow to exit the parameter setting section of the RDS-1 and return to the main menu section of the unit.

RDS-1 Precision RDS/RBDS Monitor

6 Running the Setup Program

To run the setup program, plug in the RDS-1 and press any of the keys located on the front panel while the INITIALIZATION message is being displayed. After a few seconds the RDS-1 will display a flashing RUNNING SETUP message as it enters the program.

6-1 Main Setup Menu Selections

RESET DEFAULTS ? Resets the RDS-1 to default factory settings including the passwords. Pressing the UP PARAMETER key when this message is displayed will reset the unit to default settings. Pressing any other key will advance to the next selection. The default settings are as follows:

HOLD 1.0 SEC
TIME MODE - PAST
INFINITE - OFF
REMOTE - OFF

PASSWORDS

OBSERVER: BELAR1
OPERATOR: BELAR2
SUPERVISOR: BELAR3

ID:....RDS-1.

MODIFY OPTIONS ? Press the UP PARAMETER button to enter the MODIFY OPTIONS submenu. This submenu contains the settings related to the RS-232, Unit Interface and the RDS standard being used.

MODIFY ID ? Press the UP PARAMETER button to enter the MODIFY ID submenu. This submenu allows the user to edit the unit's identification string.

MODIFY RELAYS ? Press the UP PARAMETER button to enter the MODIFY RELAYS submenu. This submenu allows the user to program the three internal relays.

UNIT INFO ? Press the UP PARAMETER button to enter the UNIT INFO submenu. This submenu displays the unit's serial number and EPROM version.

TEST RELAYS ? This submenu allows the relays to be tested. Press the UP PARAMETER button to enter the TEST RELAYS submenu.

TEST RS-232 ? This submenu allows the RS-232 port to be tested. Press the UP PARAMETER button to enter the TEST RS-232 submenu.

EXIT SETUP ? Exits the SETUP MENU and returns the unit to normal operation. Press the UP PARAMETER button to exit the setup program.

The Wizard System

6-2 MODIFY OPTIONS SubMenu Selections

STANDARD: RBDS/RDS	Selects which measurement standard the unit is set to. The RBDS standard used in the U.S. or the RDS standard used in European and other countries.
BAUD RATE 1200/2400/4800/9600	Selects the baud rate for the RS-232 Port. This baud rate should be set to the same baud rate as the device the RDS-1 is being interfaced with.
PASSWORDS - ON/OFF	Enables/disables password protection of the unit when it is accessed with The Wizard Software. If passwords are disabled, the user will not be prompted to enter a password when establishing a connection with the unit. If the RDS-1 is connected to a external MODEM the passwords should be enabled to protect the unit from unauthorized users. If a direct or hard-wired connection is used the password protection may not be needed.
EXT SYNC - ON/OFF	Determines whether or not the unit synchronizes its data collection to the PC's internal time of day clock. When using The Wizard Software the EXT SYNC should be enabled. This guarantees that the PC and remote unit are locked to the same time reference.
INTERFACE: MASTER/SLAVE	Selects the configuration of the Unit Interface. The Unit Interface is used to connect to other units in The Wizard System for unified remote operation. Only one unit may have its Unit Interface set to MASTER. The MASTER unit controls the Unit Interface activity. Typically the FMMA-1 would be set to MASTER and the RDS-1 to SLAVE.
EXIT ?	Pressing the UP PARAMETER button exits the MODIFY OPTIONS submenu and returns the Main Setup Menu.

6-3 MODIFY ID SubMenu Selections

ID(X):XXXXXXXXXX	The unit ID is a 10 character string used to uniquely identify a unit when it is accessed remotely. The string is set by default to "....RDS-1." when the unit is shipped. This string may be altered by using the UP PARAMETER button to scroll through the available ASCII characters at the current cursor position. The current cursor position is indicated in the parentheses. The cursor position is changed by using the DOWN PARAMETER button.
EXIT ?	Pressing the UP PARAMETER button exits the MODIFY ID submenu and returns the Main Setup Menu.

RDS-1 Precision RDS/RBDS Monitor

6-4 MODIFY RELAYS SubMenu Selections

RLY#X: PILOT	NO/NC	This submenu selection allows the user to program each of the three internal relays in the unit (RLY#0, RLY#1, or RLY#2) to activate under any one of five possible conditions. These conditions are: 19 kHz Pilot presence (PILOT) 57 kHz RDS subcarrier presence (RDS) Unit synchronization to the RDS data stream (SYNC) Presence of Program Type 30 (PTY#30) Presence of Program Type 31 (PTY#31)
RDS	NO/NC	
SYNC	NO/NC	
PTY #30	NO/NC	
PTY #31	NO/NC	
NONE	NO/NC	

The individual relay contact pairs can be set to close (NO) or open (NC) when the relay is activated. Any of the relays may also be disabled (NONE).

To program the relays, press the UP PARAMETER button at the MODIFY RELAYS submenu selection. Again, use the UP PARAMETER button to select which operating condition you want to activate the relay. Use the DOWN PARAMETER button to set the contact position during relay activation (NO or NC). Use the UP MENU button to select the next relay for programming or to go to the EXIT submenu selection.

The normal factory default relay settings are:

RLY#0 PILOT NO (The relay contacts close when the PILOT LED lights)
RLY#1 RDS NO (The relay contacts close when the RDS LED lights)
RLY#2 SYNC NO (The relay contacts close when the SYNC LED lights)

EXIT ? Pressing the UP PARAMETER button exits the MODIFY RELAYS submenu and returns the Main Setup Menu.

6-5 UNIT INFO SubMenu Selections

VERSION X.XX	Indicates the EPROM version installed in the unit.
SERIAL# 36XXXX	Indicates the unit's factory serial number.
EXIT ?	Pressing the UP PARAMETER button exits the UNIT INFO submenu and returns to the Main Setup Menu.

The Wizard System

6-6 TEST RELAY SubMenu Selections

RELAY #X - OPEN/CLOSE Allows the relays to be tested. The relay number being tested is displayed along with the its state, either open or closed. The test program will continually cycle the chosen relay open and closed. To change the relay being tested press the UP or DOWN PARAMETER button.

EXIT ? Pressing the UP PARAMETER button exits the TEST RELAY submenu and returns to the Main Setup Menu.

6-7 TEST RS-232 SubMenu Selections

TRANSMIT \$XX X
RECEIVE \$XX X
RECEIVE FAILED X

The RS-232 test alternately transmits a \$55 and \$AA over the interface. The display shows the byte being transmitted followed by the byte received. If no byte is received a "RECEIVE FAILED" message is displayed. In addition to testing the Rx and Tx lines the test also toggles the DTR on the Tx and reads the CD line on the Rx. The "0" or "1" displayed after the data byte is the current logic state of the DTR or CD line.

EXIT ? Pressing the UP PARAMETER button exits the TEST RS-232 submenu and returns to the Main Setup Menu.

7 Remote Communications with the RDS-1

The RDS-1 can also be accessed directly through its RS-232 serial connector. If you plan to write software to access the RDS-1 directly, please contact Belar for more information.

RDS-1 Precision RDS/RBDS Monitor

8 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 provide 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. Parts orders can be put on your VISA, MasterCard, or American Express card, or we can ship them COD.

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

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

Appendix A: Using The Wizard Software

Getting Started

Using The Wizard Software any Belar Monitor equipped with an RS-232 Port can be operated from any IBM-compatible personal computer, either through a direct connection (on-site) or from any distance via telephone/modem connection. It can also control other Belar units connected to it using The Wizard Interface. With The Wizard Interface multiple units in a series can be accessed remotely using a single RS-232 port.

Direct Connection

Equipment Required:

- The Wizard Software.
- An IBM compatible PC with an RS-232C serial (COM) port.
- An RS-232 cable with a 9 pin female D-connector at one end (for the Belar unit) and the appropriate connector for your computer (generally either a 9 or 25 pin female D-connector). For direct connection to a PC, only a three wire connection is actually needed: Rx, TX and GND. The various cable pinouts are below; your computer manual may also offer helpful information.

Generally, the RS-232 cable for direct connection is referred to as a "null modem" cable. For your convenience, the proper pin-out follows:

Pinout for Direct Connection (if your computer has a 9-pin D connector serial port):

<u>PC</u>	<u><====></u>	<u>Belar Unit</u>
2 - Rx	<u><===</u>	3 - Tx
3 - Tx	<u>==></u>	2 - Rx
5 - GND	<u><====></u>	5 - GND

Pinout for Direct Connection (if your computer has a 25-pin D connector serial port):

<u>PC</u>	$\longleftrightarrow$	<u>Belar Unit</u>
3 - Rx	$\longleftarrow$	3 - Tx
2 - Tx	$\longrightarrow$	2 - Rx
7 - GND	$\longleftrightarrow$	5 - GND

Procedure:

1. Connect one end of your RS-232 cable to the port on the back of the unit labeled "RS232", and connect the other end to the RS-232 (COM) port of your personal computer.
2. For safety's sake, if you plan to run The Wizard Software directly from the floppy disk, make a backup copy first and store the original in a safe place.
Alternatively, copy The Wizard software to your hard disk, preferably in its own subdirectory (we suggest C:\WIZ).
3. From the **A>** or **C:\WIZ>** prompt, type **WIZ** and press **Enter**. Once the software has been started, pressing **F1** will bring up context-sensitive help.
4. Using the mouse, select the **Communications** menu from the top of the screen. If you do not have a mouse, press Alt-C. A drop-down menu will appear:

Start Communications
Connect VIA MODEM
Setup MODEM/RS232
Send Command String
Change Password
About
Exit

Select **Setup Modem/RS232** (using the arrow keys) and press **Enter**. Using the arrow and tab keys, configure your computer to the proper COM port, IRQ, and speed. Press **F1** in this screen for more information on any of these selections. Once you have made the selections, select Start Communications to establish a connection to the unit. The unit comes configured from the factory with a Supervisor password of **BELAR3**.

Connection via Modem

Equipment Required:

- The Wizard Software.
- An IBM compatible computer with at least a 1200 baud (preferably 2400 baud or greater) Hayes-compatible modem, internal or external.
- An external 1200 or 2400 baud external modem (for connection to the unit), set up as described below.
- An RS-232 cable with a 9 pin female D-connector at one end (for the unit) and the appropriate connector for your external modem (generally either a 9 or 25 pin female D-connector). For reliable external modem operation all five lines from the unit's RS-232C connector should be used. The pinout of this cable follows.
- A telephone line for connecting the two modems.

Pinout for Modem connection (25-pin D connector serial port at modem):

<u>PC</u>	<u><==></u>	<u>Belar Unit</u>
2 - Rx	<u><==</u>	3 - Tx
3 - Tx	<u>==></u>	2 - Rx
7 - GND	<u><==></u>	5 - GND
8 - CD	<u>==></u>	1 - CD
20 - DTR	<u><==</u>	4 - DTR

External Modem Setup:

Most external modems have non-volatile memory for storing configuration information. In order to configure the modem to work with the unit you must have a computer with a RS-232 port and some kind of communications software or other way of communicating with your modem. Connect the external modem to the computer using the appropriate cable and access it using your communications software. Using the appropriate AT commands set up the modem to do the following:

AT command Description

ATS0=n Puts modem in Auto-Answer mode, where "n" is the number of rings desired before the call will be answered. Note: "n" cannot equal 0 (we suggest n=1).

- AT&C1 Carrier Detect (CD) active during connect.
- AT&D3 Data Terminal Ready (DTR) disconnect and reset.
- AT&W0 Writes user configuration to non-volatile memory.

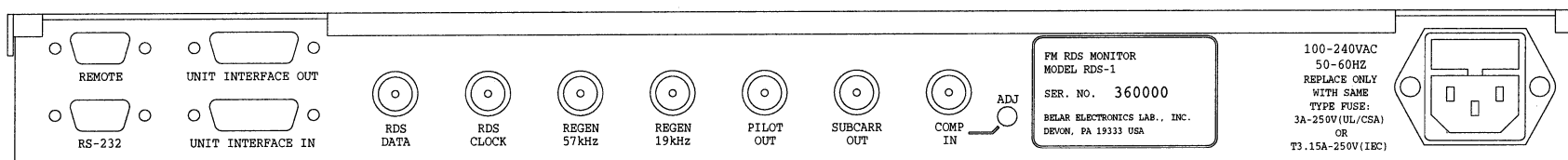
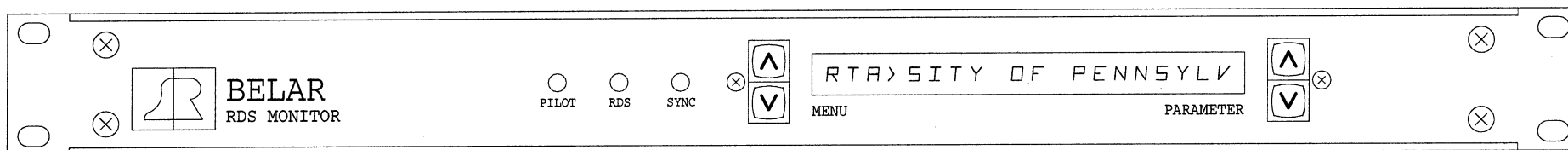
Some modems have various data compression schemes to increase the apparent speed under certain circumstances. Be sure to configure your modem to disable such compression schemes. Refer to your modem and communication software manuals if you encounter problems.

Procedure:

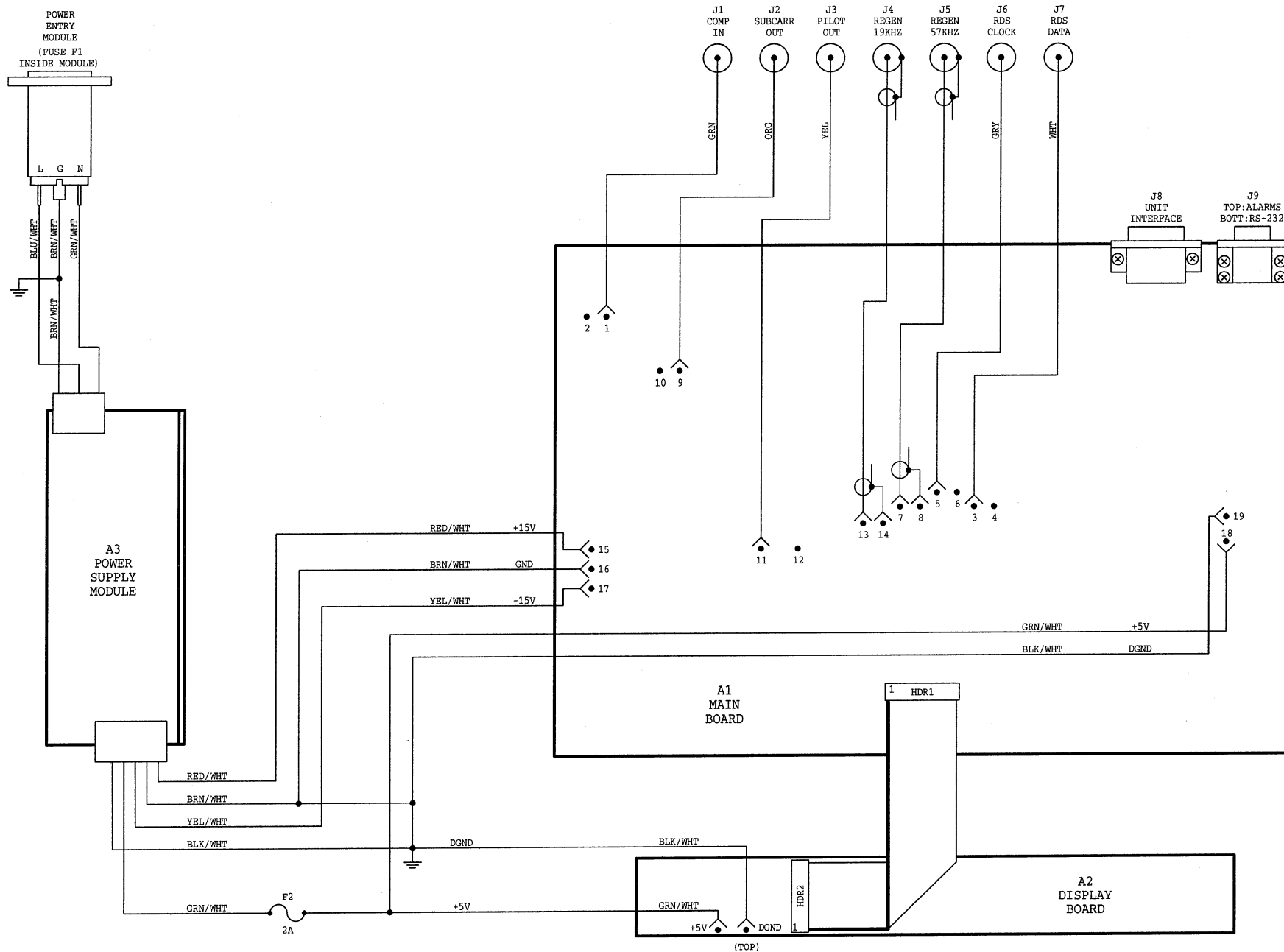
1. For safety's sake, if you plan to run The Wizard software directly from the floppy disk, make a backup copy first and store the original in a safe place. Alternatively, copy The Wizard software to your hard disk, preferably in its own subdirectory (we suggest C:\WIZ).
2. From the **A>** or **C:\WIZ>** prompt, type **WIZ** and press **Enter**. The Wizard front panel will appear in the lower half of your screen.
3. Using the mouse, select the **Communications** menu from the top of the screen. If you do not have a mouse, press Alt-C. A drop-down menu will appear:

Start Communications Connect VIA MODEM Setup MODEM/RS232 Send Command String Change Password
About
Exit

Select **Setup Modem/RS232** (using the arrow keys) and press **Enter**. Using the arrow and tab keys, configure your computer to the proper COM port, IRQ, speed, and telephone number(s). Press **F1** in this screen for more information on any of these selections. Once you have made the selections, select **Connect VIA MODEM** to instruct your modem to dial up the modem at the remote unit and established a connection. The unit comes configured from the factory with a Supervisor password of **BELAR3**.



RDS-1 FRONT & REAR VIEW
BELAR ELECTRONICS

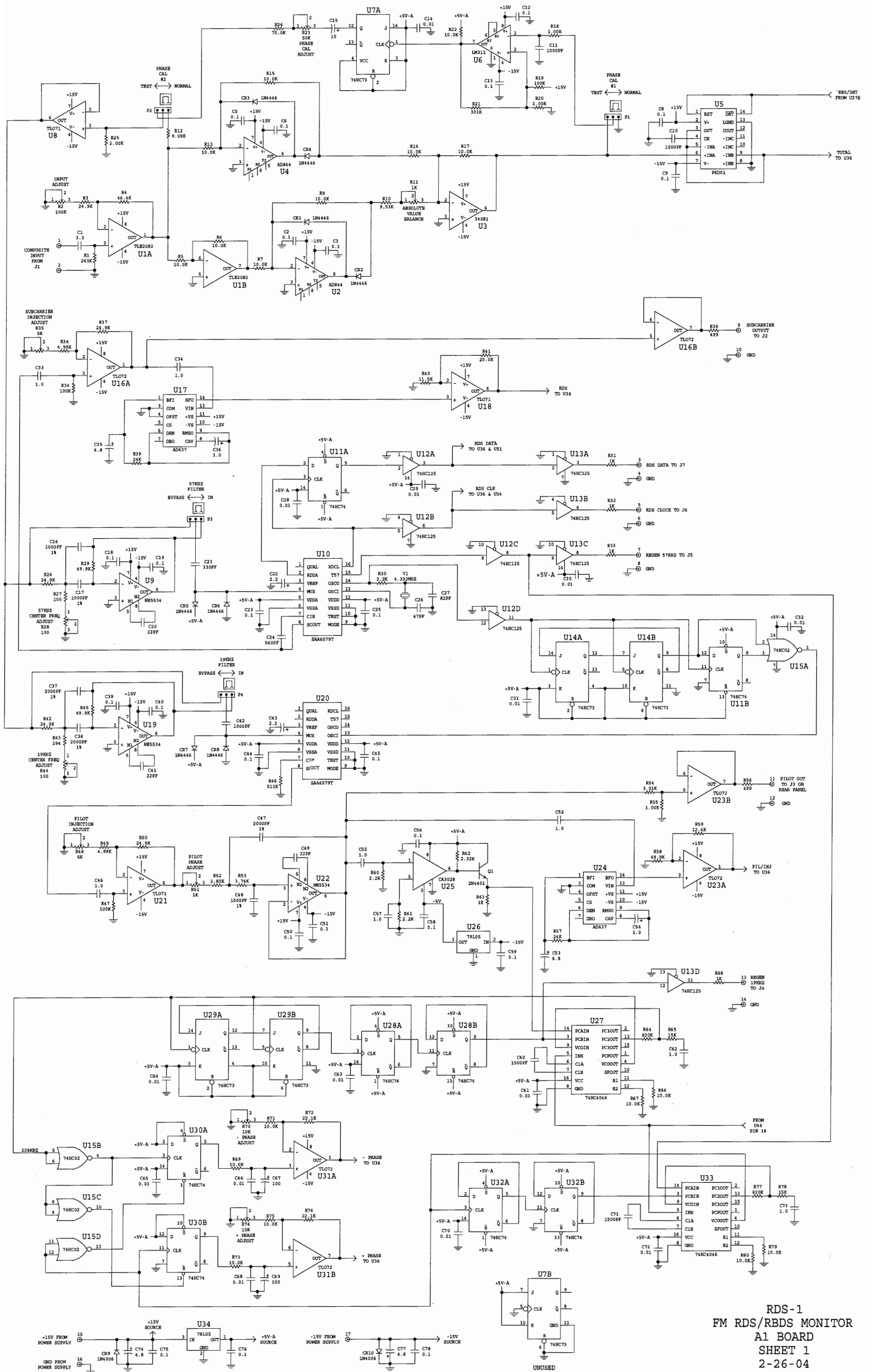


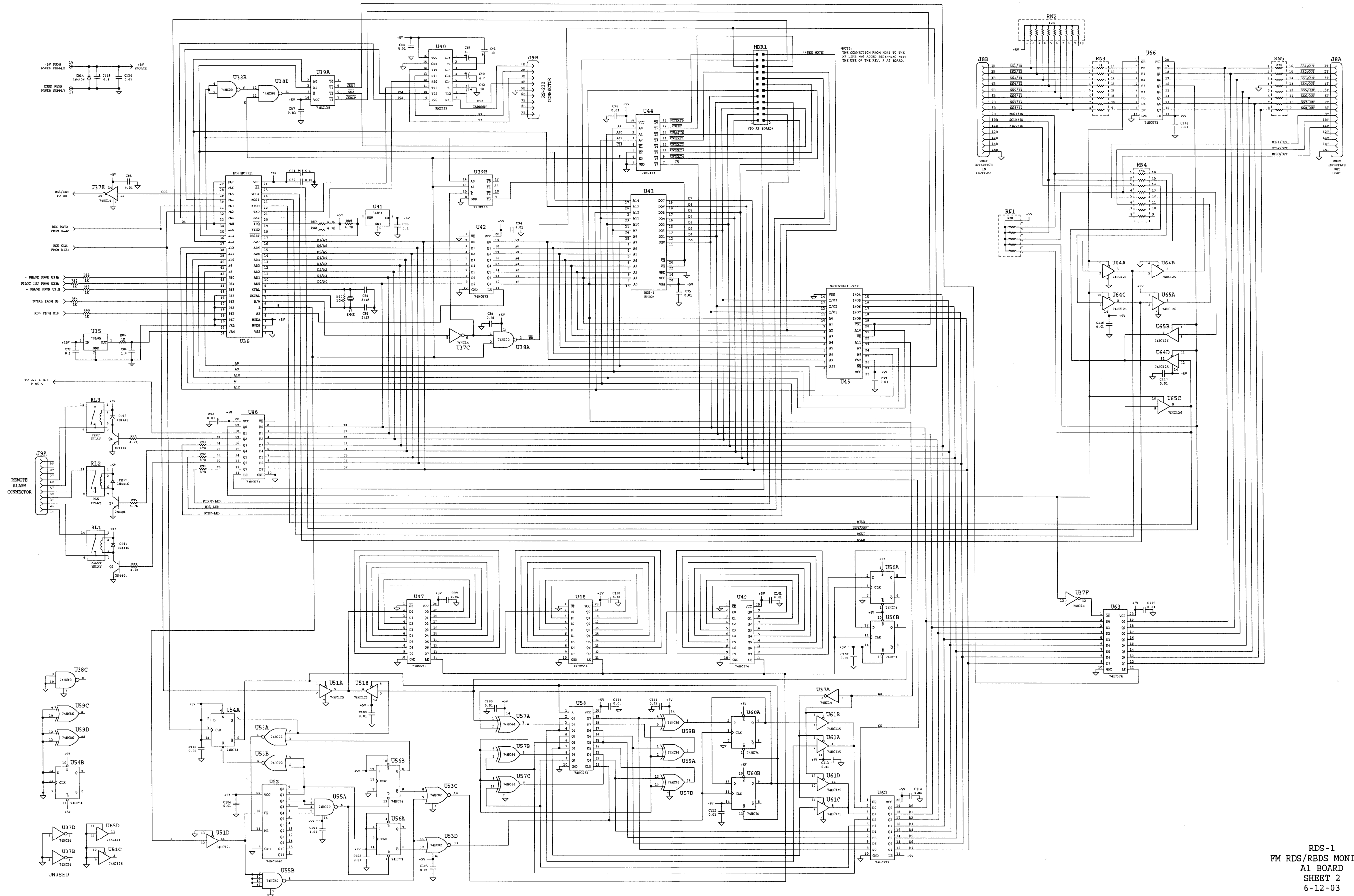
RDS-1 CHASSIS WIRING
 BELAR ELECTRONICS
 2-27-97

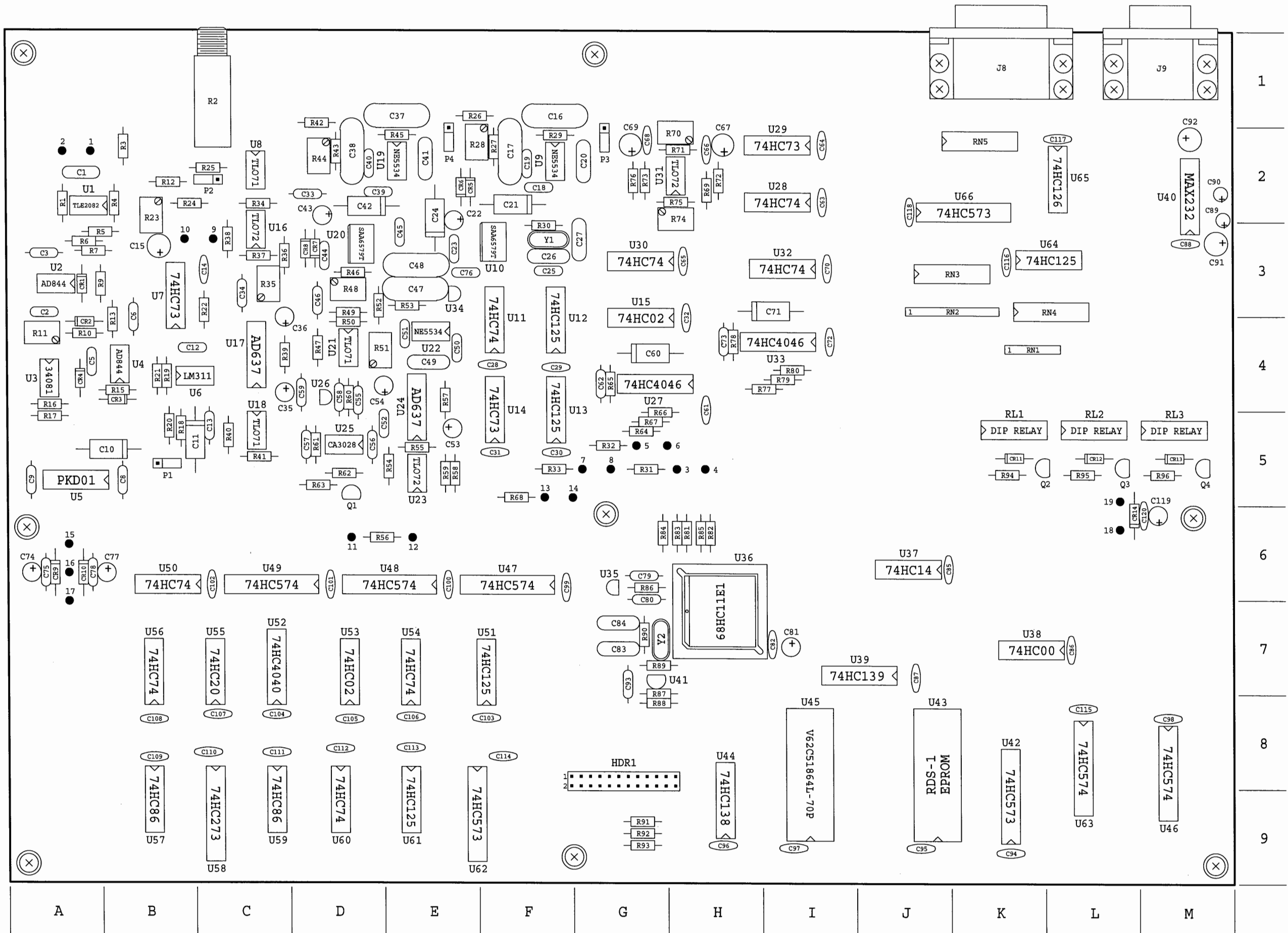
RDS-1 PARTS LISTS

MAIN CHASSIS

Reference Designation	Description	Part Number
A3	POWER SUPPLY MODULE: 15W	4005-0019A
--	POWER ENTRY MODULE: 6EGG1-1	0360-0021
F1	FUSE: GMA-3A 250V(UL/CSA)	2110-0009
--	or T3.15A-250V(IEC)	
--	FUSE HOLDER: CHASSIS MOUNT	2110-0010
F2	FUSE: AGC-2A 250V	2110-0006
J1 thru J7	JACK: BNC	0360-0005
--	FLAT CABLE ASSEMBLY: 24 CONDUCTOR	8900-0009
--	LINE CORD (115 Vac line voltage)	8120-0002
--	LINE CORD (230 Vac line voltage)	8120-0004







RDS-1 A1 BOARD
COMPONENT LAYOUT
BELAR ELECTRONICS

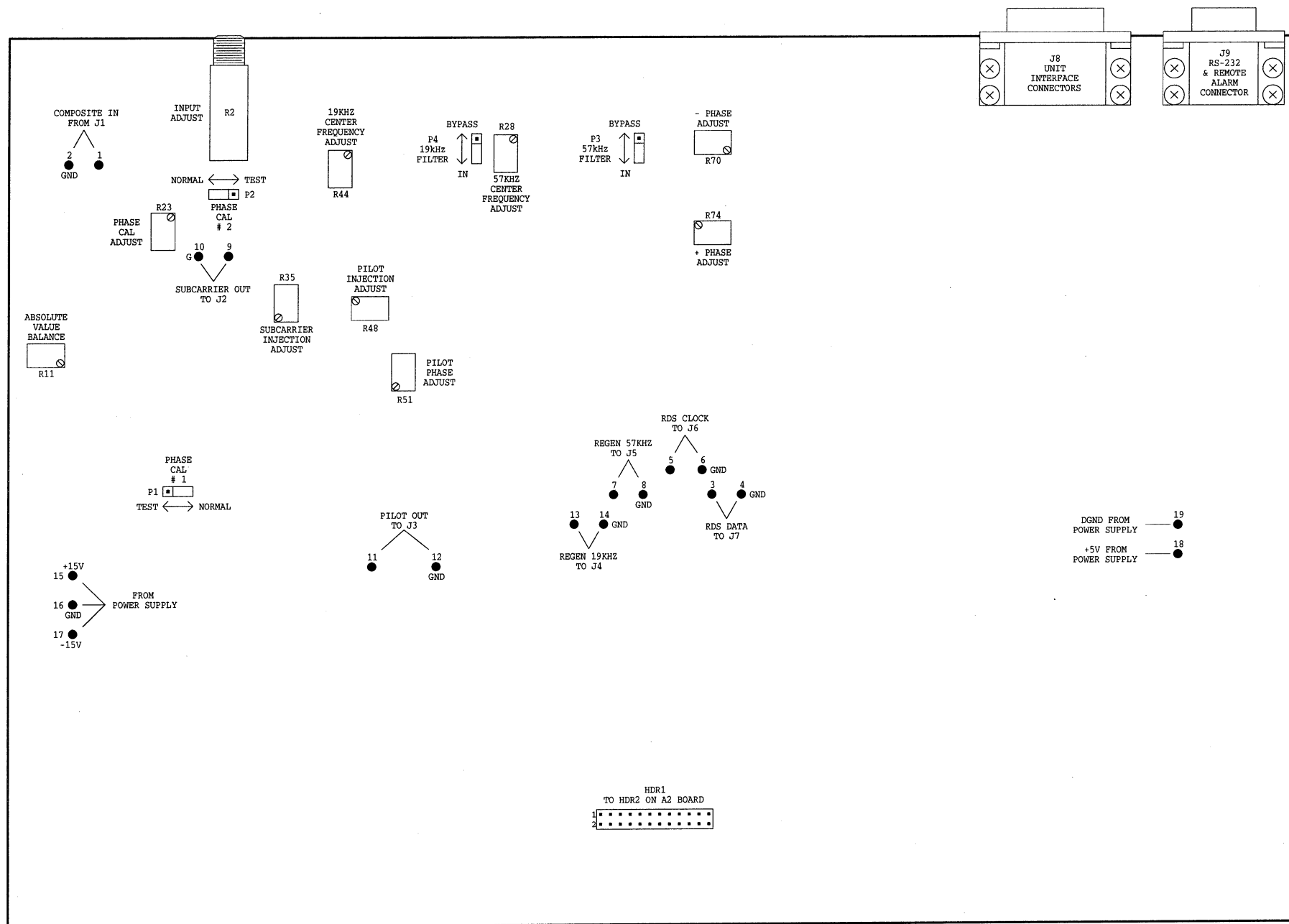
RDS-1 A1 BOARD
PART LOCATIONS

<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>	<u>Desig/Loc</u>
C1	A2	C45	E3	C89	M2	CR12	L5	R25	C2	R69	H2
C2	A3	C46	D3	C90	M2	CR13	M5	R26	E1	R70	H2
C3	A3	C47	E3	C91	M3	CR14	L6	R27	F2	R71	H2
C4	A3	C48	E3	C92	M2			R28	E2	R72	H2
C5	A4	C49	E4	C93	G7	HDR1	G8	R29	F2	R73	G2
C6	B4	C50	E4	C94	K9			R30	F3	R74	H2
C7	B5	C51	E4	C95	J9	J8	K1	R31	G5	R75	H2
C8	B5	C52	E5	C96	H9	J9	M1	R32	G5	R76	G2
C9	A5	C53	E5	C97	I9			R33	F5	R77	I4
C10	B5	C54	D4	C98	M8	P1	B5	R34	C2	R78	H4
C11	B5	C55	D4	C99	F6	P2	C2	R35	C3	R79	I4
C12	B4	C56	D5	C100	E6	P3	G2	R36	C3	R80	I4
C13	C5	C57	D5	C101	D6	P4	E2	R37	C3	R81	H6
C14	C3	C58	D4	C102	C6			R38	C3	R82	H6
C15	B3	C59	D4	C103	F8			R39	C4	R83	H6
C16	F1	C60	G4	C104	C8	Q1	D5	R40	C5	R84	G6
C17	F2	C61	H4	C105	D8	Q2	K5	R41	C5	R85	H6
C18	F2	C62	G4	C106	E8	Q3	L5	R42	D1	R86	G6
C19	F2	C63	I2	C107	C8	Q4	M5	R43	D2	R87	G7
C20	G2	C64	I2	C108	B8			R44	D2	R88	G8
C21	F2	C65	H3	C109	B8	R1	A2	R45	E2	R89	G7
C22	E2	C66	H2	C110	C8	R2	C1	R46	D3	R90	G7
C23	E3	C67	H2	C111	C8	R3	B2	R47	D4	R91	G9
C24	E2	C68	G2	C112	D8	R4	B2	R48	D3	R92	G9
C25	F3	C69	G2	C113	E8	R5	A3	R49	D3	R93	G9
C26	F3	C70	I3	C114	F8	R6	A3	R50	D4	R94	K5
C27	G3	C71	I3	C115	L8	R7	A3	R51	D4	R95	L5
C28	F4	C72	I4	C116	K3	R8	A3	R52	D3	R96	M5
C29	F4	C73	H4	C117	L2	R9	A3	R53	E3		
C30	F5	C74	A6	C118	J2	R10	A4	R54	E5	RL1	K5
C31	F5	C75	A6	C119	M6	R11	A4	R55	E5	RL2	L5
C32	H4	C76	E3	C120	M6	R12	B2	R56	D6	RL3	M5
C33	D2	C77	B6			R13	B4	R57	E4		
C34	C3	C78	A6	CR1	A3	R14	B4	R58	E5	RN1	K4
C35	C4	C79	G6	CR2	A4	R15	B4	R59	E5	RN2	K3
C36	C4	C80	G6	CR3	B4	R16	A4	R60	D4	RN3	K3
C37	E1	C81	I7	CR4	A4	R17	A5	R61	D5	RN4	L3
C38	D2	C82	I7	CR5	E2	R18	B5	R62	D5	RN5	K2
C39	D2	C83	G7	CR6	E2	R19	B4	R63	D5		
C40	D2	C84	G7	CR7	D3	R20	B5	R64	G5	U1	A2
C41	E2	C85	J6	CR8	D3	R21	B4	R65	G4	U2	A3
C42	D2	C86	L7	CR9	A6	R22	C3	R66	G5	U3	A4
C43	D2	C87	J7	CR10	A6	R23	B2	R67	G5	U4	B4
C44	D3	C88	M3	CR11	K5	R24	B2	R68	F5	U5	A5

RDS-1 A1 BOARD
PART LOCATIONS
cont.

Desig/Loc Desig/Loc

U6	C4	U49	C6
U7	B3	U50	B6
U8	C2	U51	F7
U9	F2	U52	C7
U10	F3	U53	D7
U11	F4	U54	E7
U12	F4	U55	C7
U13	F4	U56	B7
U14	F4	U57	B9
U15	G4	U58	C9
U16	C3	U59	C9
U17	C4	U60	D9
U18	C5	U61	E9
U19	E2	U62	E9
U20	D3	U63	L8
U21	D4	U64	L3
U22	E4	U65	L2
U23	E5	U66	K2
U24	E4		
U25	D5	Y1	F3
U26	D4	Y2	G7
U27	G4		
U28	I2	<u>pins</u>	
U29	I2	1	A2
U30	G3	2	A2
U31	H2	3	H5
U32	I3	4	H5
U33	I4	5	G5
U34	E3	6	G5
U35	G6	7	G5
U36	H7	8	G5
U37	J6	9	C3
U38	K7	10	B3
U39	J7	11	D6
U40	M2	12	E6
U41	G7	13	F5
U42	K9	14	F5
U43	J8	15	A6
U44	H9	16	A6
U45	I8	17	A7
U46	M8	18	L6
U47	F6	19	L5
U48	E6		



RDS-1 A1 BOARD
 CONNECTIONS & ADJUSTMENTS
 BELAR ELECTRONICS

A1 BOARD RDS-1

Reference Designation	Description	Part Number
C1	C: FIXED CERAMIC 3.3uF 50V	0151-0011
C2	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C3	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C4,C5*	C: FIXED CERAMIC 0.1uF 50V	0151-0015
*C4 is not used when U2 is an AD844 IC.		
C6 thru C9*	C: FIXED CERAMIC 0.1uF 50V	0151-0006
*C7 is not used when U4 is an AD844 IC.		
C10,C11	C: FIXED POLY 1000pF 2.5% 160V	0130-1022
C12	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C13	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C14	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C15	C: FIXED TANT 10uF 16V	0185-0007
C16,C17	C: FIXED MICA 1000pF 1%	0141-1021
C18,C19	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C20	C: FIXED MICA 22pF 5%	0140-2205
C21	C: FIXED POLY 330pF 2.5% 160V	0130-3312
C22	C: FIXED TANT 2.2uF 35V	0185-0009
C23	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C24	C: FIXED POLY 560pF 2.5% 160V	0130-5612
C25	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C26	C: FIXED MICA 47pF 5%	0140-4705
C27	C: FIXED MICA 82pF 5%	0140-8205
C28 thru C32	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C33,C34	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C35	C: FIXED TANT 6.8uF 25V	0185-0002
C36	C: FIXED TANT 1.0uF 35V	0185-0006
C37,C38	C: FIXED MICA 2000pF 1%	0141-2021
C39,C40	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C41	C: FIXED MICA 22pF 5%	0140-2205
C42	C: FIXED POLY 1000pF 2.5% 160V	0130-1022
C43	C: FIXED TANT 2.2uF 35V	0185-0009
C44,C45	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C46	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C47	C: FIXED MICA 2000pF 1%	0141-2021
C48	C: FIXED MICA 1000pF 1%	0141-1021
C49	C: FIXED MICA 22pF 5%	0140-2205
C50,C51	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C52	C: FIXED CERAMIC 1.0uF 50V	0151-0016
C53	C: FIXED TANT 6.8uF 25V	0185-0002
C54	C: FIXED TANT 1.0uF 35V	0185-0006
C55	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C56	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C57	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C58,C59	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C60	C: FIXED POLY 1500pF 2.5% 160V	0130-1522
C61	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C62	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C63 thru C66	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C67	C: FIXED TANT 100uF 6.3V	0185-0010
C68	C: FIXED CERAMIC 0.01uF 100V	0151-0003

A1 BOARD RDS-1 cont.

Reference Designation	Description	Part Number
C69	C: FIXED TANT 100uF 6.3V	0185-0010
C70	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C71	C: FIXED POLY 1500pF 2.5% 160V	0130-1522
C72	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C73	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C74	C: FIXED TANT 6.8uF 25V	0185-0002
C75	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C76	C: FIXED CERAMIC 0.1uF 50V	0151-0015
C77	C: FIXED TANT 6.8uF 25V	0185-0002
C78,C79	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C80	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C81	C: FIXED TANT 6.8uF 25V	0185-0002
C82	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C83,C84	C: FIXED MICA 24pF 5%	0140-2405
C85 thru C88	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C89,C90	C: FIXED TANT 4.7uF 10V	0185-0001
C91,C92	C: FIXED TANT 10uF 16V	0185-0007
C93	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C94 thru C118	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C119	C: FIXED TANT 6.8uF 25V	0185-0002
C120	C: FIXED CERAMIC 0.01uF 100V	0151-0003
CR1 thru CR8	DIODE: 1N4446	1900-0002
CR9,CR10	DIODE: 1N4006	1900-0016
CR11 thru CR13	DIODE: 1N4446	1900-0002
CR14	DIODE: 1N4006	1900-0016
HDR1	HEADER: 24 PIN	0361-0024
J8	CONNECTOR: "D" DUAL 15 PIN	0360-0033
J9	CONNECTOR: "D" DUAL 9 PIN	0360-0034
P1 thru P4	PLUG: 3 PIN, PC MOUNT	0365-0030
--	JUMPER: 2 PIN (USED WITH P1 THRU P4)	0365-0028
Q1 thru Q4	TRANSISTOR: 2N4401	1850-0028
R1	R: METAL FILM 243k 1%	0721-2433
R2	R: VAR COMP 100k, 10 TURN	2100-0029
R3	R: METAL FILM 24.9k 1%	0721-2492
R4	R: METAL FILM 46.4k 1%	0721-4642
R5 thru R7	R: METAL FILM 10.0k 1%	0721-1002
R8*	R: METAL FILM 3k 2% 1/4W	0751-3022
*R8 is not used when U2 is an AD844 IC.		
R9	R: METAL FILM 10.0k 1%	0721-1002
R10	R: METAL FILM 9.53k 1%	0721-9531
R11	R: VAR COMP 1k, 10 TURN	2100-0021
R12	R: METAL FILM 9.09k 1%	0721-9091
R13	R: METAL FILM 10.0k 1%	0721-1002
R14*	R: METAL FILM 3k 2% 1/4W	0751-3022
*R14 is not used when U4 is an AD844 IC.		

A1 BOARD RDS-1 cont.

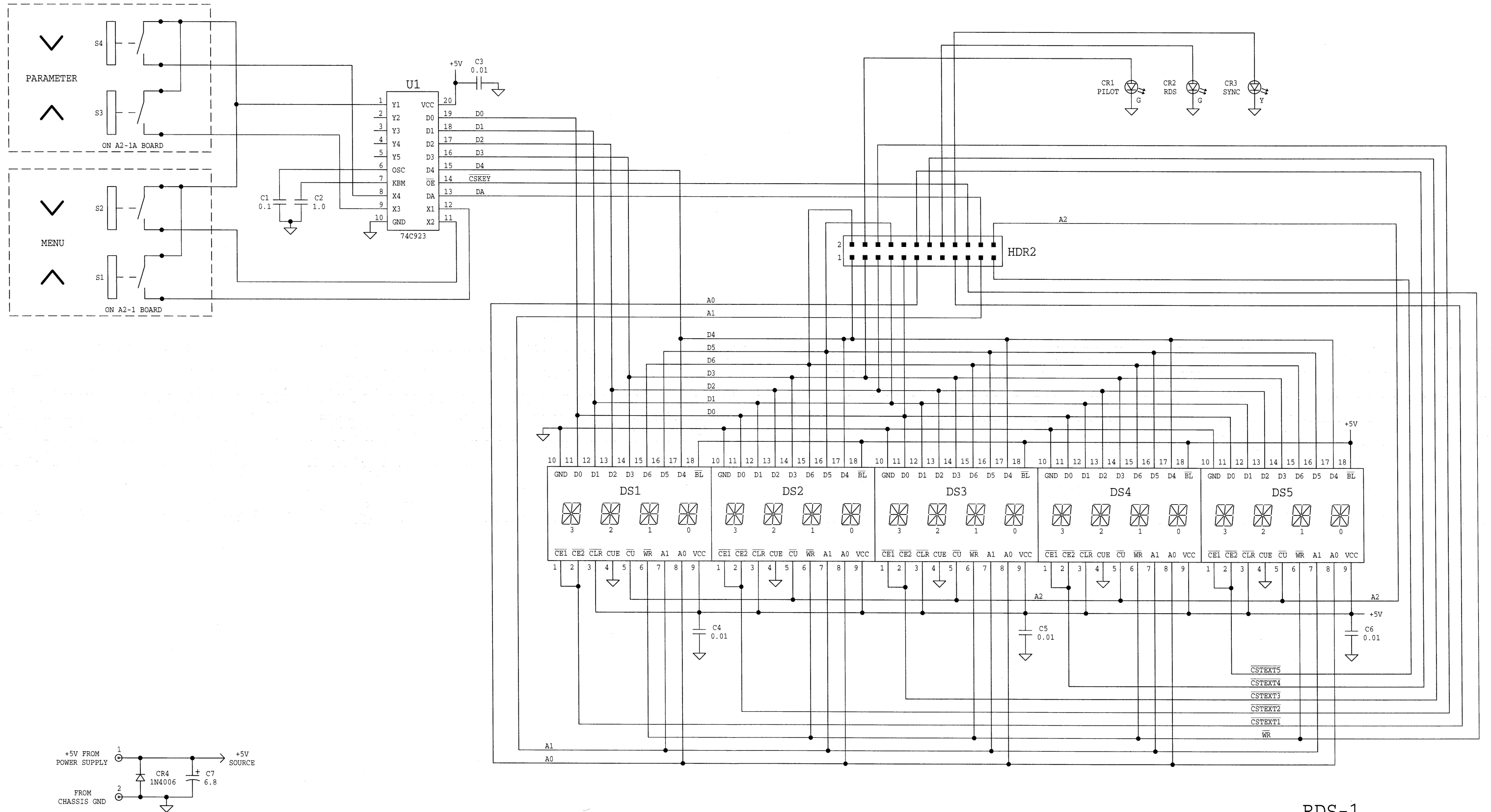
Reference Designation	Description	Part Number
R15 thru R17	R: METAL FILM 10.0k 1%	0721-1002
R18	R: METAL FILM 1.00k 1%	0721-1001
R19	R: METAL FILM 100k 1%	0721-1003
R20	R: METAL FILM 1.00k 1%	0721-1001
R21	R: METAL FILM 301k 1%	0721-3013
R22	R: METAL FILM 10.0k 1%	0721-1002
R23	R: VAR COMP 50k, 10 TURN	2100-0025
R24	R: METAL FILM 75.0k 1%	0721-7502
R25	R: METAL FILM 2.00k 1%	0721-2001
R26	R: METAL FILM 24.9k 1%	0721-2492
R27	R: METAL FILM 100 1%	0721-1000
R28	R: VAR COMP 100, 10 TURN	2100-0022
R29	R: METAL FILM 49.9k 1%	0721-4992
R30	R: METAL FILM 2.2k 2% 1/4W	0751-2222
R31 thru R33	R: METAL FILM 1k 2% 1/4W	0751-1022
R34	R: METAL FILM 100k 2% 1/4W	0751-1042
R35	R: VAR COMP 5k, 10 TURN	2100-0020
R36	R: METAL FILM 4.99k 1%	0721-4991
R37	R: METAL FILM 24.9k 1%	0721-2492
R38	R: METAL FILM 499 1%	0721-4990
R39	R: METAL FILM 24k 2% 1/4W	0751-2432
R40	R: METAL FILM 11.5k 1%	0721-1152
R41	R: METAL FILM 20.0k 1%	0721-2002
R42	R: METAL FILM 24.9k 1%	0721-2492
R43	R: METAL FILM 294 1%	0721-2940
R44	R: VAR COMP 100, 10 TURN	2100-0022
R45	R: METAL FILM 49.9k 1%	0721-4992
R46	R: METAL FILM 511k 1%	0721-5113
R47	R: METAL FILM 100k 2% 1/4W	0751-1042
R48	R: VAR COMP 5k, 10 TURN	2100-0020
R49	R: METAL FILM 4.99k 1%	0721-4991
R50	R: METAL FILM 24.9k 1%	0721-2492
R51	R: VAR COMP 1k, 10 TURN	2100-0021
R52	R: METAL FILM 2.80k 1%	0721-2801
R53	R: METAL FILM 3.74k 1%	0721-3741
R54	R: METAL FILM 3.01k 1%	0721-3011
R55	R: METAL FILM 1.00k 1%	0721-1001
R56	R: METAL FILM 499 1%	0721-4990
R57	R: METAL FILM 24k 2% 1/4W	0751-2432
R58	R: METAL FILM 49.9k 1%	0721-4992
R59	R: METAL FILM 12.4k 1%	0721-1242
R60,R61	R: METAL FILM 2.2k 2% 1/4W	0751-2222
R62	R: METAL FILM 2.32k 1%	0721-2321
R63	R: METAL FILM 1k 2% 1/4W	0751-1022
R64	R: METAL FILM 820k 2% 1/4W	0751-8242
R65	R: METAL FILM 15k 2% 1/4W	0751-1532
R66,R67	R: METAL FILM 10.0k 1%	0721-1002
R68	R: METAL FILM 1k 2% 1/4W	0751-1022
R69	R: METAL FILM 10.0k 1%	0721-1002

A1 BOARD RDS-1 cont.

Reference Designation	Description	Part Number
R70	R: VAR COMP 10k, 10 TURN	2100-0024
R71	R: METAL FILM 10.0k 1%	0721-1002
R72	R: METAL FILM 22.1k 1%	0721-2212
R73	R: METAL FILM 10.0k 1%	0721-1002
R74	R: VAR COMP 10k, 10 TURN	2100-0024
R75	R: METAL FILM 10.0k 1%	0721-1002
R76	R: METAL FILM 22.1k 1%	0721-2212
R77	R: METAL FILM 820k 2% 1/4W	0751-8242
R78	R: METAL FILM 15k 2% 1/4W	0751-1532
R79,R80	R: METAL FILM 10.0k 1%	0721-1002
R81 thru R86	R: METAL FILM 1k 2% 1/4W	0751-1022
R87 thru R89	R: METAL FILM 4.7k 2% 1/4W	0751-4722
R90	R: FIXED CARBON 10M 5% 1/4W	0683-1065
R91 thru R93	R: METAL FILM 470 2% 1/4W	0751-4712
R94 thru R96	R: METAL FILM 4.7k 2% 1/4W	0751-4722
RL1 thru RL3	RELAY: JWD-107-1 (or HE721A6341)	1600-0007
RN1	R: NETWORK 6 PIN 10k	0906-1032
RN2	R: NETWORK 10 PIN 10k	0910-1032
RN3	R: NETWORK 16 PIN DIP 1k	0908-1022
RN4,RN5	R: NETWORK 16 PIN DIP 270	0908-2712
U1	IC: TLE2082	1826-0069
U2*	IC: AD844	1826-0052
U3	IC: MC34081	1826-0041
U4*	IC: AD844	1826-0052
*prior to Feb, 2004 U2 & U4 were the LM318 IC.		
U5	IC: PKD01	1827-0001
U6	IC: LM311	1826-0009
U7	IC: 74HC73	1822-0044
U8	IC: TLO71	1826-0004
U9	IC: NE5534	1826-0025
U10	IC: SAA6579T	1876-0001
U11	IC: 74HC74	1822-0067
U12,U13	IC: 74HC125	1822-0045
U14	IC: 74HC73	1822-0044
U15	IC: 74HC02A	1822-0040
U16	IC: TLO72	1826-0038
U17	IC: AD637	1827-0003
U18	IC: TLO71	1826-0004
U19	IC: NE5534	1826-0025
U20	IC: SAA6579T	1876-0001
U21	IC: TLO71	1826-0004
U22	IC: NE5534	1826-0025
U23	IC: TLO72	1826-0038
U24	IC: AD637	1827-0003
U25	IC: CA3028	1826-0034
U26	IC: 79L05CP	1826-0017

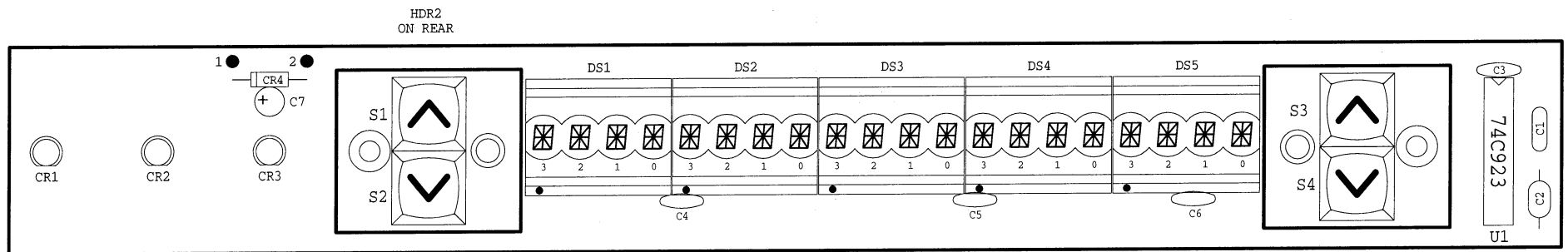
A1 BOARD RDS-1 cont.

Reference Designation	Description	Part Number
U27	IC: 74HC4046	1822-0049
U28	IC: 74HC74	1822-0067
U29	IC: 74HC73	1822-0044
U30	IC: 74HC74	1822-0067
U31	IC: TLO72	1826-0038
U32	IC: 74HC74	1822-0067
U33	IC: 74HC4046	1822-0049
U34, U35	IC: 78L05CP	1826-0012
U36	IC: MC68HC11E1	1840-0010
U37	IC: 74HC14A	1822-0042
U38	IC: 74HC00	1822-0039
U39	IC: 74HC139A	1822-0048
U40	IC: MAX232	1823-0001
U41	IC: MC34064	1826-0048
U42	IC: 74HC573	1822-0052
U43	IC: RDS-1 EPROM	1840-0011B
U44	IC: 74HC138	1822-0047
U45	IC: V62C51864L-70P	1840-0005
U46 thru U49	IC: 74HC574	1822-0053
U50	IC: 74HC74	1822-0067
U51	IC: 74HC125	1822-0045
U52	IC: 74HC4040A	1822-0062
U53	IC: 74HC02A	1822-0040
U54	IC: 74HC74	1822-0067
U55	IC: 74HC20	1822-0060
U56	IC: 74HC74	1822-0067
U57	IC: 74HC86	1822-0069
U58	IC: 74HC273	1822-0068
U59	IC: 74HC86	1822-0069
U60	IC: 74HC74	1822-0067
U61	IC: 74HC125	1822-0045
U62	IC: 74HC573	1822-0052
U63	IC: 74HC574	1822-0053
U64	IC: 74HC125	1822-0045
U65	IC: 74HC126A	1822-0046
U66	IC: 74HC573	1822-0052
Y1	CRYSTAL: 4.332 MHz	0411-0006
Y2	CRYSTAL: 8 MHz	0411-0005



RDS-1
FM RDS/RBDS MONITOR
A2 & A2-1 DISPLAY BOARDS
REV. A
BELAR ELECTRONICS
6-12-03

PRIOR TO REV. A OF THE A2 BOARD, PIN 5 OF DS1 THRU DS5 WAS CONNECTED TO +5V.



RDS-1 A2
REV. A
DISPLAY BOARD
COMPONENT LAYOUT
BELAR ELECTRONICS

A2 BOARD RDS-1, REV. A

Reference Designation	Description	Part Number
C1	C: FIXED CERAMIC 0.1uF 50V	0151-0006
C2	C: FIXED CERAMIC 1.0uF 50V	0151-0008
C3 thru C6	C: FIXED CERAMIC 0.01uF 100V	0151-0003
C7	C: FIXED TANT 6.8uF 25V	0185-0002
CR1,CR2	LED: GREEN CMD5453	1910-0003
CR3	LED: YELLOW MV5353	1910-0002
CR4	DIODE: 1N4006	1900-0016
DS1 thru DS5*	DISPLAY: HDLO-2416	1930-0008
	(prior to rev. A, DS1 thru DS5 were the HPDL2416 display, Belar P/N 1930-0005. These parts are not interchangeable.)	
HDR2	HEADER: 24 PIN	0361-0024
S1 thru S4	SWITCH: PUSHBUTTON, MOMENTARY (ON A2-1 BOARDS)	3105-0001
U1	IC: 74C923	1823-0006