



DX602-C1

Two Antenna Diversity Receiver for UAV

User's Guide & Operating Manual

AV010220/1-000
REV. X0 – 14 Oct 2005

Edited by Guru Mujumdar

<http://www.avalonrf.com/>

Avalon RF, Inc. • 344 Coogan Way • El Cajon, CA 92020
Phone: (619) 401-1969 • Fax: (619) 401-1971 • Email: sales@avalonrf.com

Table of Contents

1.	General	1
	Figure A – Front Panel	2
	Figure B – Rear Panel – Broadcasting	3
	Figure C – Rear Panel – Security	3
2.	Specifications	4
	Interface	4
	Figure D – Interface - Security Version	4
	Power Input	5
	Video Output	5
	Data Output	5
	Antenna Inputs	5
	RSSI Output	5
	Remote Programming Connections	5
	Size	6
	Weight	6
	Figure E – DX602 Mechanical Specifications - Inches [mm]	7
	Environmental Conditions	8
3.	Operating Instructions	9
	Human Interface	9
	Front Panel Frequency Select Switches	9
	Front Panel Indicators	9
	Operating the DX602	9
	Tuning	9
4.	Ordering Information	10
	Optional features	10
	Optional accessories	11
	Figure F – Block Diagram – Basic System w/ Single Receiver	13
	Figure G – Block Diagram – Basic System with Four Receivers	14
	Appendix A – Remote Programming	15

1. General

The DX602-C1 is a rugged 2-antenna 'true' diversity video receiver intended for demanding high end video applications. The unit has special features added for the UAV applications.

It is a analog FM receiver with our intelligent electronics that selects the best 'video' signal to be sent to the output.

The standard audio channel is modified to receive data at 4800 Baud.

The DX602 tuning range is from 2400 MHz to 2500 MHz. (**)

The DX602 receiver has the following standard channels:

A video channel.

A data channel.

(**) Optional - Extended Range from 2150 to 2500 MHz.

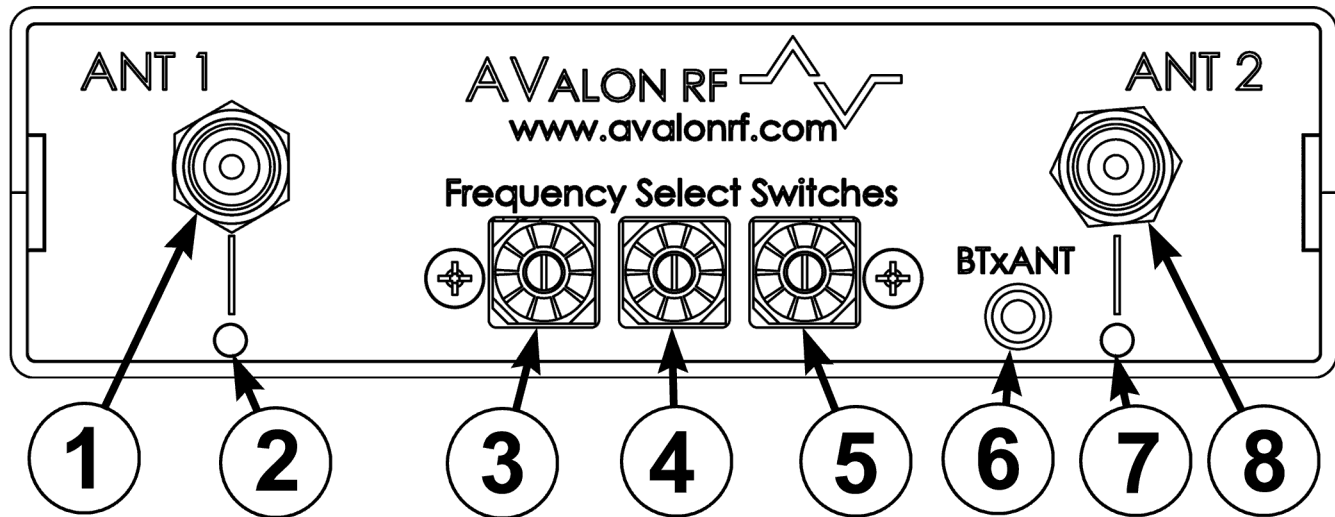


Figure A – Front Panel
DX602-C1 Controls, Indicators and Connectors

- 1 - Antenna 1 Input
- 2 - Antenna 1 Select LED
- 3 - Frequency Selector Switch/EIN 1
- 4 - Frequency Selector Switch/EIN 2
- 5 - Frequency Selector Switch/EIN 3
- 6 - BTx (Back Channel Transmitter) Antenna (NOT APPLICABLE)
- 7 - Antenna 2 Select LED
- 8 - Antenna 2 Input

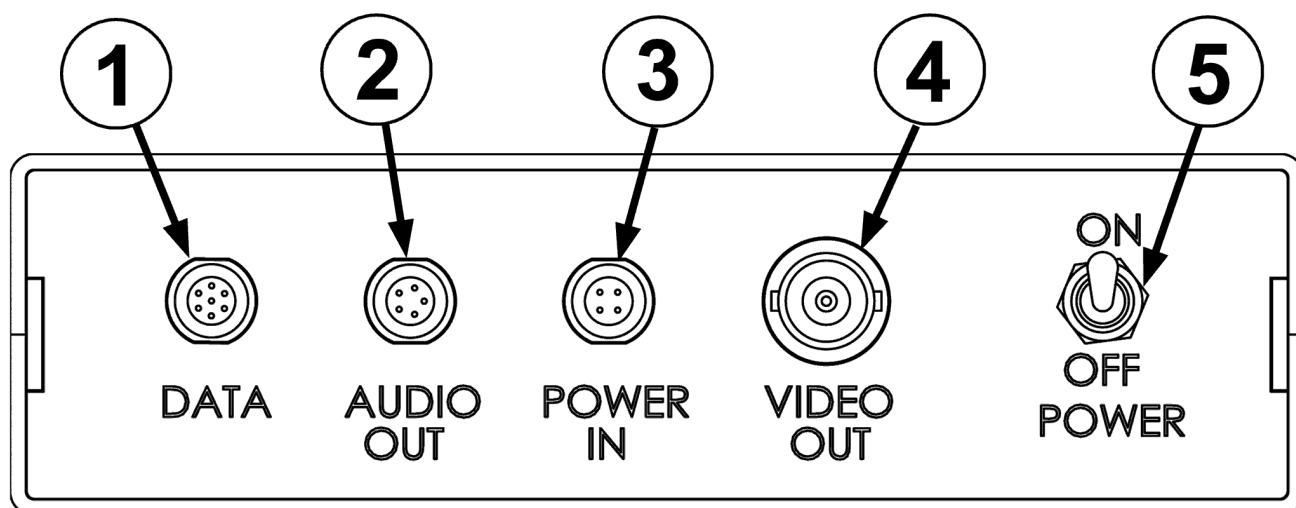


Figure B – Rear Panel – Broadcasting
DX402/DX502/DX602 Controls and Connectors
NOT APPLICABLE

- | | |
|--------------------------------|--------------------------------|
| 1 - Data Output (section 2.4) | 4 - Video Output (section 2.6) |
| 2 - Audio Output (section 2.5) | 5 - On/Off Switch |
| 3 - Power In (section 2.1) | |

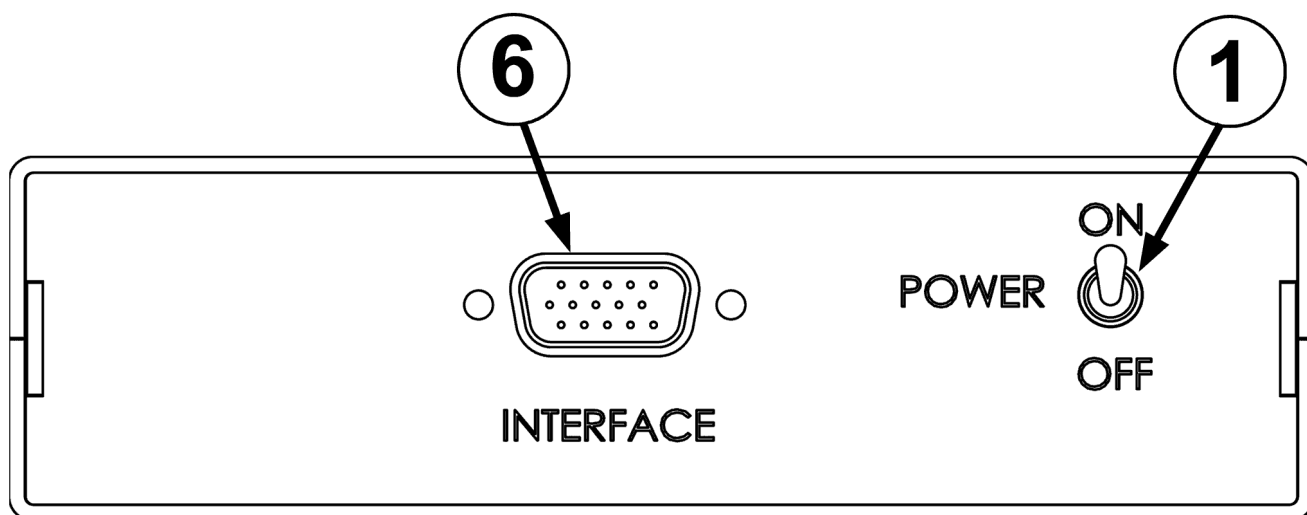


Figure C – Rear Panel – Security
DX602-C1 Controls and Connectors

- | | |
|-------------------|-----------------------------|
| 1 - On/Off Switch | 6 - Interface (section 2.7) |
|-------------------|-----------------------------|

2. Specifications

2.1 Interface - (Figure C, circle 6).

The interface is through a High Density DB15 connector (Figure D) on the rear panel of the DX602.

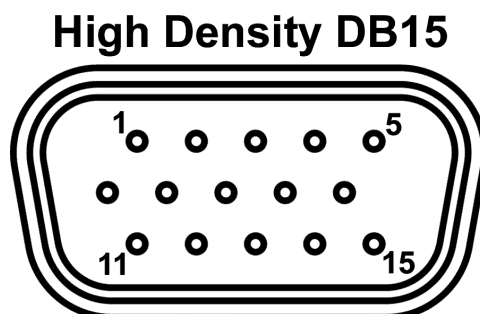


Figure D – Interface - Security Version

Pin #	Function	Pin #	Function
1	Power Input	9	Signal Ground
2	Video Output	10	Tuner1 RSSI Output
3	Video Return Ground	11	Alarm Output-N/A
4	Data Output (Downlink)	12	RS-485 I/O 'A'- N/A
5	Microphone Input- N/A	13	RS-485 I/O 'B'- N/A
6	DX602-C1 Programming RS232 Tx	14	Tuner 2 RSSI Output
7	DX602-C1 Programming RS232 Rx	15	Telemetry 3 Output-N/A
8	Power Return Ground		

NOTE: Do Not connect to the pins marked N/A (Not Applicable). These pins have internal connections/ voltages and could damage internal circuitry.

2.2.1 Power Input (pins 1 and 8).

- a) The DX602 operates off a 9Vdc to 16Vdc unregulated voltage source with a ripple of less than 0.5Vp.p.
- b) Input current at an input voltage of 12Vdc is under 0.6 Amps.
- c) Power is switched via an ON/OFF mechanical switch.
- d) The DX602 power input is protected against over voltage and reverse polarity.

2.2.2 Video Output (pins 2 and 3).

- a) The DX602 video output is NTSC/PAL/RS170A/CCIR base-band, 75 Ohm.
- b) Output amplitude is 1 V(p.p.) with negative sync tips of 0.3 V(p.p.)

2.2.3 Data Output (Downlink) (pins 4 and 9).

The DX602 data output is at RS232 compatible levels at 4800 Baud.

2.3 Antenna Inputs, total of 2 (Circles 1 & 8 on front panel).

DX602: The tuning frequency range is 2400-2500 MHz, FM modulated. The antenna connectors are SMA type with a 50 Ω (ohm) impedance. An option extends the range from 2150 to 2500 MHz.

2.4 RSSI Outputs (pins 10, 14 and pin 8)

The RSSI outputs from both the tuners are brought out for monitoring/tracking purposes. These are buffered outputs and have a range of 0-4V.

2.5 Remote Programming Connections (pin 6, 7 and pin 9).

The DX602 can be remotely programmed via a RS232C interface. Data rate is 9600 baud, 8 bits, no parity, ASCII encoded per protocol described in Appendix A.

2.6 Size

Configuration	Dimensions
DX602-C1 (See Figure H)	5.09" W x 1.42" H x 5.75" D 129mm x 36mm x 146mm

NOTES

The DX602 is intended for mounting in the following configurations:

- a) In a CD ROM bay in a DVR*
- b) Three DX602s on a 19" Retma rack drawer, 1U high.*
- c) Ten DX602s on a 19" Retma rack drawer, 3U high.*
- d) Inside other OEM equipment, with or without covers.*

2.7 Weight

Net Weight	1 lb. (0.46Kg)
Shipping weight	2 lbs. (0.92Kg)

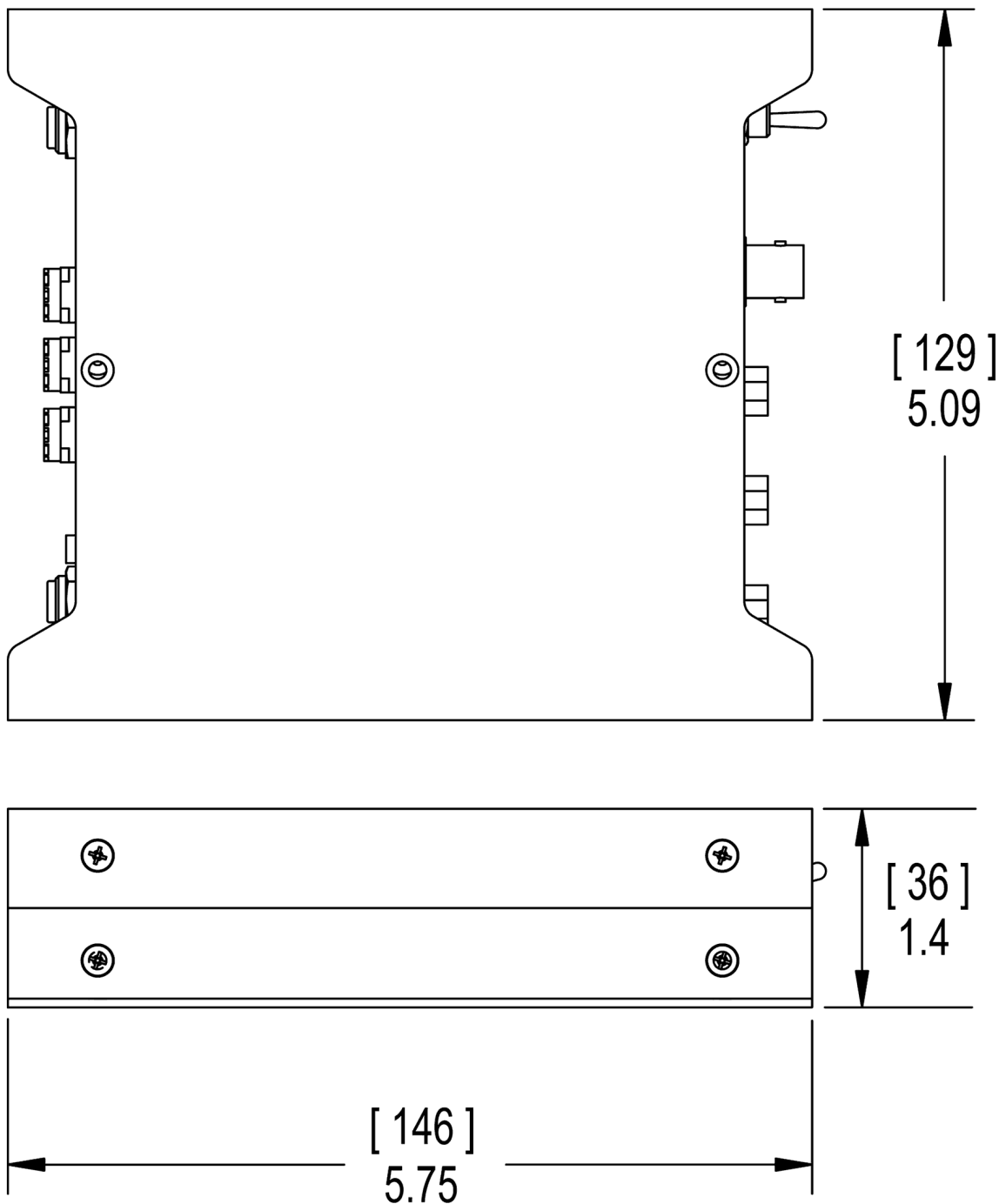


Figure E – DX602 Mechanical Specifications - Inches [mm]

2.8 Environmental Conditions.

The DX602 is designed to meet the following environmental conditions:

- a) Operating temperature -4° to 122° F
(-20° to 50° C)
- b) Storage temperature -13° to 150° F
(-25° to 65° C)
- c) Vibration 1.5G, from 10Hz to 2KHz, sine wave, three axis
- d) Shock 15G, 25msec, half sine wave, three axis
- e) Humidity 5 to 95%, non-condensing
- f) Inclination Any
- g) Altitude -1500 feet to 15,000 feet
(-450 meter to 4,500 meter)

3. Operating Instructions

3.1 Human Interface.

3.1.1 Front Panel Frequency Select Switches (Circles 3,4,5 on figure A)

The DX602 front panel switches have the following functions:

- a) Frequency select (tuning) in a standard DX602.
- b) Electronic Identification Number (EIN) in units with auto synthesizing.

3.1.2 Front Panel Indicators (Circles 2,7 on figure A).

The DX602 front panel includes antenna select LEDs. One Green LED for each antenna. The antenna LEDs indicate which of the antennas has been selected for its best video.

3.2 Operating the DX602.

The DX602 has the following user accessible functions:

3.2.1 On/Off

3.2.2 Tuning can be accomplished in 2 ways-

- a) via front panel rotary switches (Circles 3,4,5 on figure A).
2150MHz to 2500MHz 150-500 on switches
- b) Remotely via the RS232 interface (Optional).
Refer Appendix A.

4. Ordering Information

DX602-C1 – Basic System

Every DX602 comes with the following standard features and accessories.

- 4.1 One DX602 in a ZIPLOCK ESD bag.

The receiver has one video and one data channel.

- 4.2 One BX002U 12V low noise regulated AC adapter for 110Vac/60Hz.

- 4.3 A user manual (the one you're reading).

- 4.4 One reusable carton with foam lining.

4.5 **Optional features:**

Option 00	European version. Includes a 230VAC power adapter and calibration for PAL.
-----------	---

Option 04	Extended tuning range DX602 - 2.150GHz to 2.500GHz
-----------	---

Option R3	Rack mount kit to mount 3 DX602 in a rack.
-----------	--

4.6 Optional accessories

4.6.1 Antennas.

Each receiver requires two (2) antennas. Higher antenna gain yields longer range with limitations on reception "viewing angle".

Ordering information:

Description		DX602
2dbi	Omnidirectional	AX602
2dbi	omni circular polarized	AX602R
5dbi	Omnidirectional	AX605
8dbi	panel antenna	AX608
10dbi	circular polarized(RH) patch	AX610R
10dbi	circular polarized(LH) patch	AX610L
11dbi	log periodic antenna	
13dbi	panel antenna	AX613
15dbi	panel antenna	AX615
18dbi	panel antenna	AX618
20dbi	panel antenna	AX620
24dbi	parabolic dish antenna	AX624

4.6.2 Antenna cables.

These cables connect the receiver to its antennas. If a system requires splitters, these cables connect the antennas to the splitters.

DX602: Times Microwave LMR-240 50 Ω (ohm) or equivalent are recommended for runs up to 30ft and LMR-400 50 Ω (ohm) for runs from 30ft to 50ft.

Ordering Information:

Length	DX602 N-SMA/50 Ω (ohm)
5'	CBLNS-5
15'	CBLNS-15
30'	CBLNS-30
50'	CBLNS-50

4.6.3 Splitters

When a pair of antennas feeds more than one receiver, it is convenient to split the signal from each antenna to all receivers at the same location. Please remember that splitting will in turn reduce the operating range and therefore not recommended unless a link budget has the loss accounted for.

Ordering information:

Splitter type	DX602 (SMA-SMA)
1 to 2 (two DX..2)	SP2S
1 to 3 (three DX..2)	SP3S
1 to 4 (four DX..2)	SP3S
1 to 8 (eight DX..2)	SP8S

4.6.4 Splitter to receiver cables.

The use of splitters requires jumper cables from every splitter output to every receiver antenna input. Ordering information for a DX602 receiver system:

Number of DX602 Receivers	Number of cables	DX602
2	4	CBLSS-2
3	6	CBLSS-2
4	8	CBLSS-2

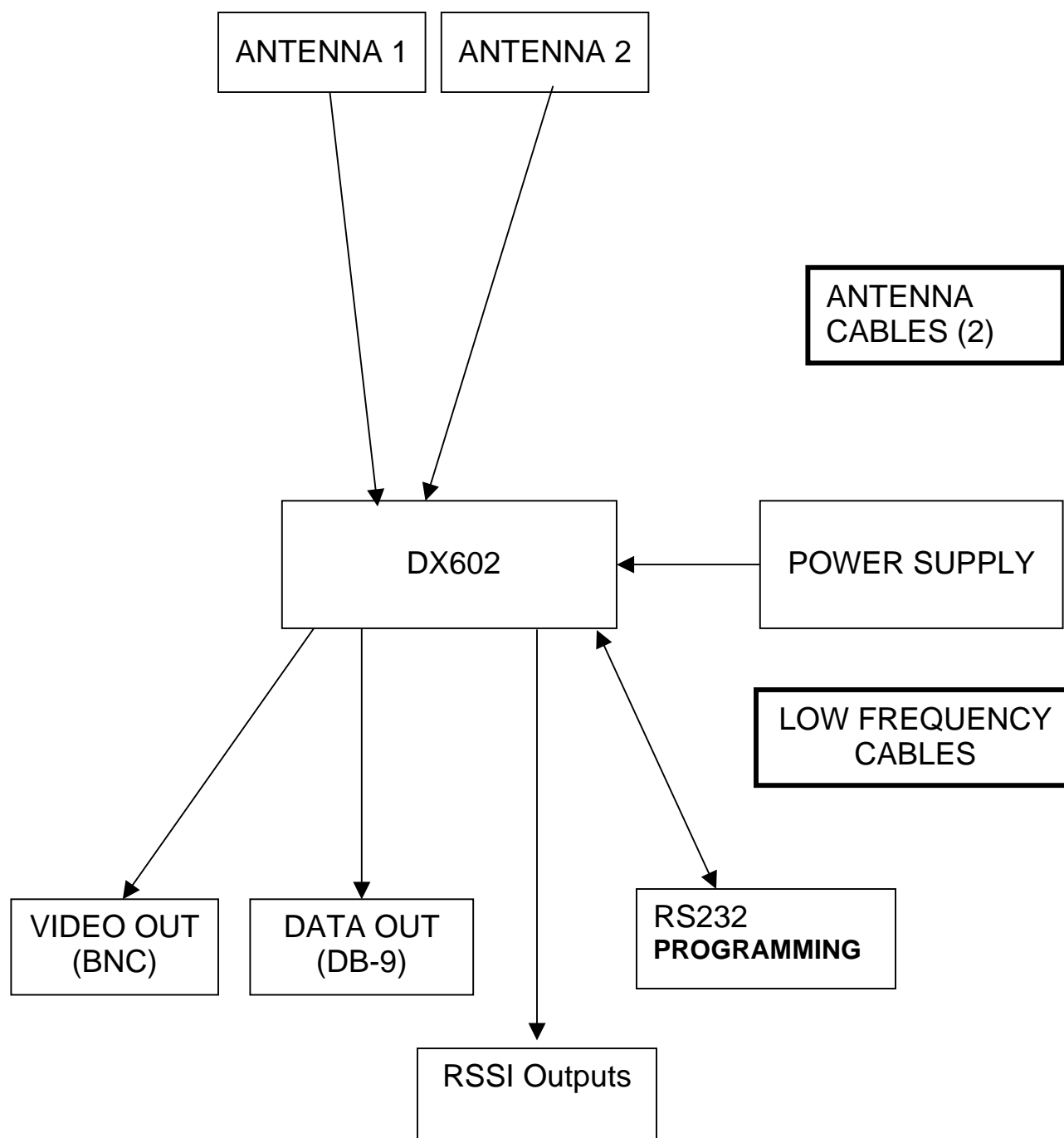


Figure F – Block Diagram of Basic System with a Single DX602 Receiver

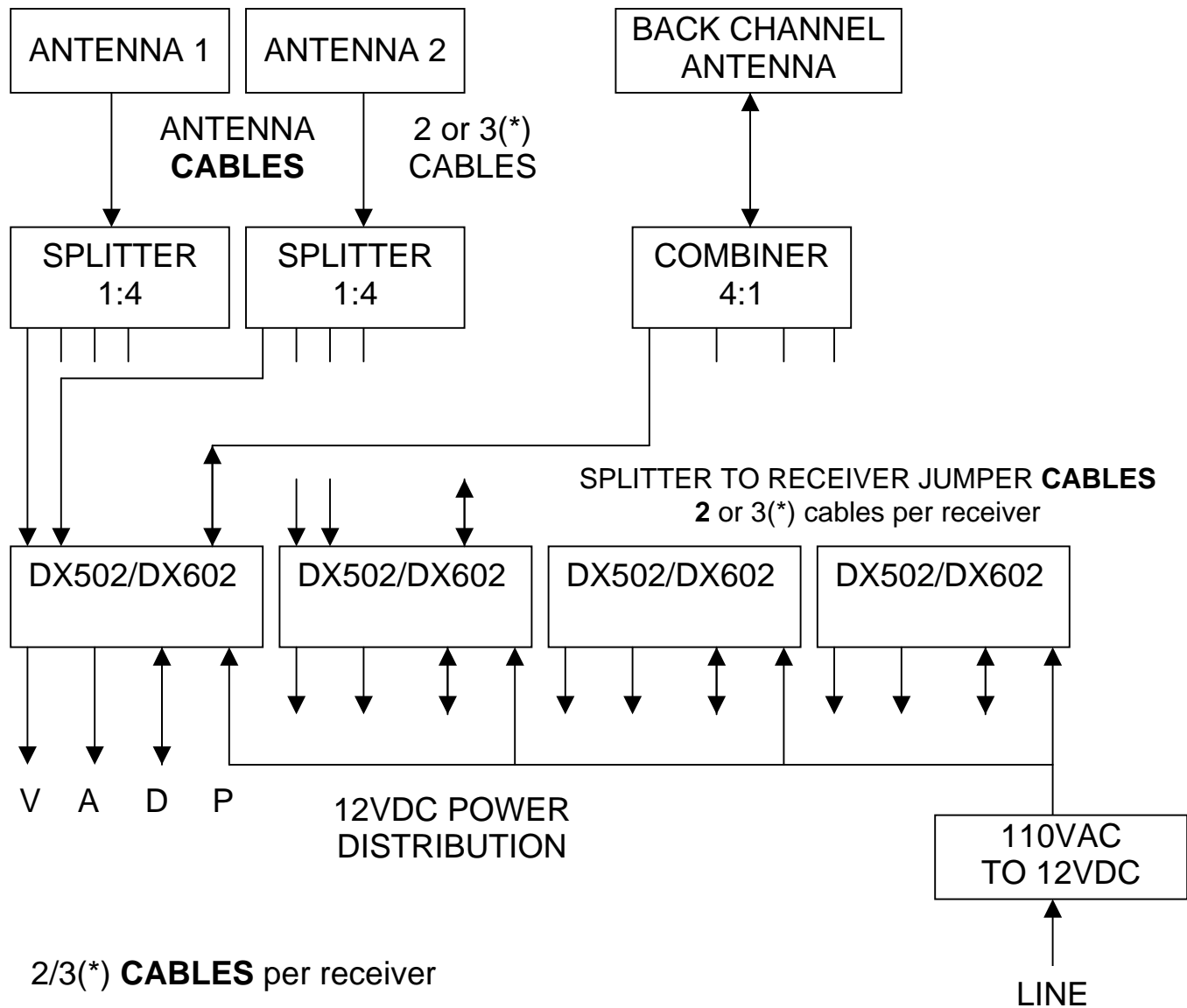


Figure G – Block Diagram of System with Four DX602 Receivers

Appendix A – Remote Programming

1. Interface.

The DX602-C1 can be remotely programmed via an RS232C interface. The data rate is set to 9600 Baud, 8 bits, no parity, 1 stop bit and no handshaking signals. Data is ASCII encoded.

All commands must be terminated by a CR, LF or CR+LF.

2. Protocol.

a) Type “[enter]” to see the current frequency setting. The DX602-C1 reports “2296.0W 650W A”. The 2296.0 is the set frequency, the W next to it indicates ‘wide bandwidth’. The 650 indicates the 6.50MHz subcarrier that carries the data. The W following it indicates the receiver is set for a ‘wide’ demodulator bandwidth of 250KHz. The “A” in the end indicates ‘Automatic’ operation – i.e the DX602 will chose the best antenna for video reception.

b) Type “T” to check tuner lock. The DX602-C1 reports “ T1=L T2=L ” implying both tuners T1 and T2 are locked.

c) Type “2379.0” to send a command to the DX602-C1 to change the received frequency to 2379.0MHz.

d) Type “*1#2” to force the DX602-C1 to receive only Antenna 2. The DX602-C1 will only receive video on Ant 2 input, and both LEDs will be off. The DX602-C1 will report- “ 2379.0W 650W M “. The M indicates ‘Manual’ mode of operation.

e) Type “*1#” to return the DX602-C1 to automatic mode.