



# **DX402 / DX502 / DX602**

## **Two Antenna Diversity**

### **Receivers**

**User's Guide & Operating Manual**

**AV010220/1-000**  
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## 1. General

The DX402/DX502/DX602 are rugged 2-antenna 'true' diversity video and audio receivers intended for demanding high end video applications.

The DX402 tuning range is from 56MHz to 802.25MHz

The DX502 tuning range is from 900 MHz to 928 MHz. (\*)

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

### NOTE

*Unless explicitly stated, every reference in this document to the DX602 also implies the DX402 and DX502. The main difference between the models is the frequency range.*

The DX602 receiver has the following standard channels:

A video channel.

An audio channel.

And the following optional features:

### **Broadcasting industry options**

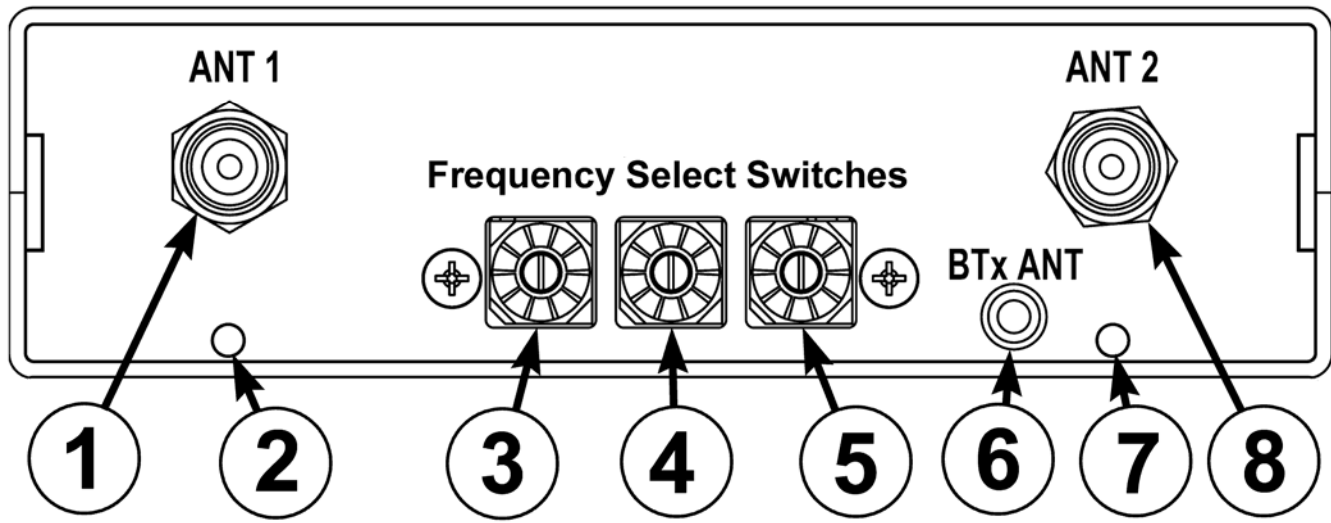
- Remote synthesizing of a TX600, TX623 or TX630.
- Talk back audio channel.
- Lemo interface connectors.

### **Security industry options**

- Remote control of the receiver via RS232.
- Remote synthesizing of a TX600, TX623 or TX630.
- Serial communication channel for Pan/Tilt/Zoom control.
- Alarm output.
- Analog telemetry outputs (three).

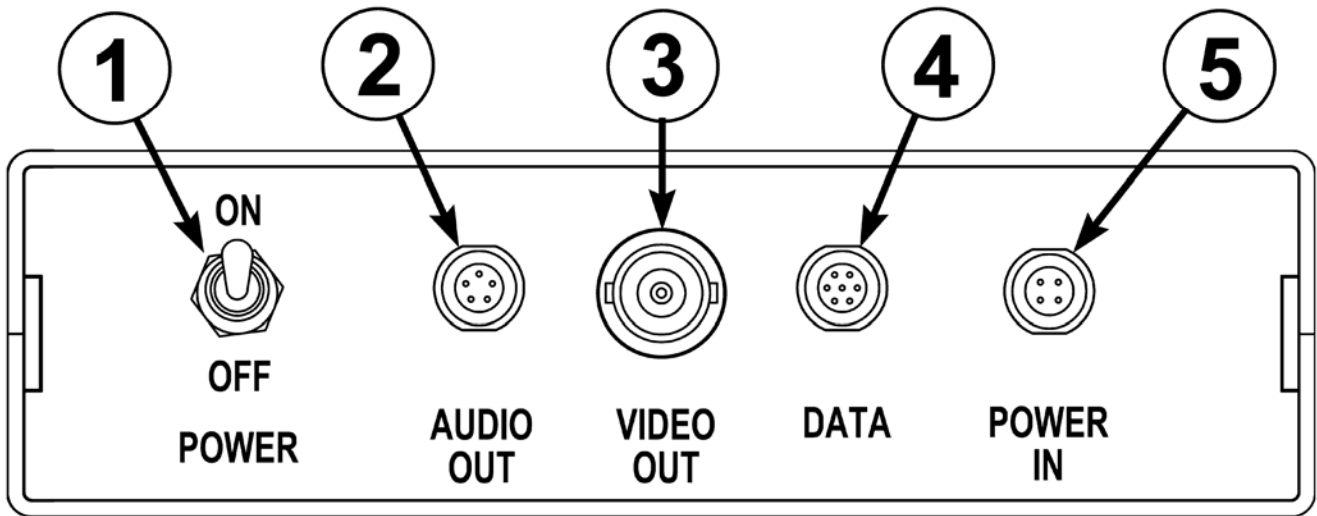
(\*) Optional - Extended Tuning Range from 900-2150 MHz.

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



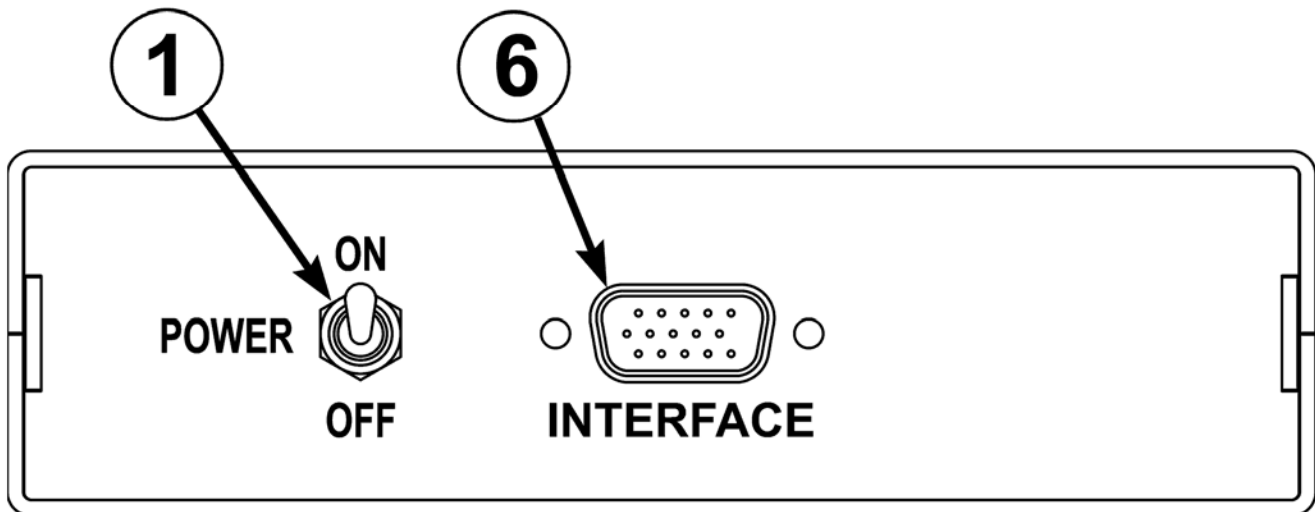
**Figure A – Front Panel (Broadcast & Security Versions)**  
DX402/DX502/DX602 Controls, Indicators and Connectors

- 1 - Antenna 1 Input
- 2 - Antenna 1 Select LED (Light Emitting Diode)
- 3 - Frequency Selector Switch/EIN 1
- 4 - Frequency Selector Switch/EIN 2
- 5 - Frequency Selector Switch/EIN 3
- 6 - BTx (Back Channel Transmitter) Antenna
- 7 - Antenna 2 Select LED
- 8 - Antenna 2 Input



**Figure B – Rear Panel – Broadcasting**  
DX402/DX502/DX602 Controls and Connectors

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



**Figure C – Rear Panel – Security**  
DX402/DX502/DX602 Controls and Connectors

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

## 2. Specifications

### 2.1 Power Input – **Broadcasting (Option 61)** (Circle 5 on rear panel).

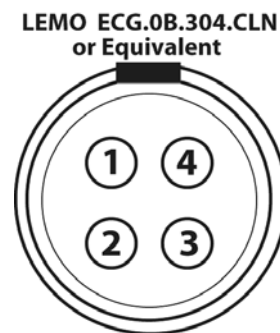
- a) The power input connector is a 4 pin on the rear panel of the DX602.

Pin 1 – Power Return

Pin 2 – Video Output

Pin 3 – Video Return

Pin 4 – Power Input (+9Vdc to +16Vdc)



**Figure D – Power Input**

- b) The DX602 operates off a 9Vdc to 16Vdc unregulated voltage source with a ripple of less than 0.5Vp.p.
- c) Input Current at an input voltage of 12Vdc is under 0.7 Amps.
- d) Power is switched via an ON/OFF mechanical switch.
- e) The DX602 power input is protected against over voltage and reverse polarity.

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

- a) DX402: The tuning frequency range is 56MHz-802MHz, VSB modulated. The antenna connectors are "F" type with a 75  $\Omega$  (ohm) impedance.
- b) DX502: The tuning frequency range is 900-928 MHz, FM modulated. The antenna connectors are "F" type with a 75  $\Omega$  (ohm) impedance. An option extends the range from 900 to 2150 MHz.
- c) DX602: The tuning frequency range is 2400-2500 MHz, FM modulated. The antenna connectors are SMA type with a 50  $\Omega$  (ohm) impedance. An option extends the range from 2150 to 2500 MHz.

2.3 Video Output – **Broadcasting (Option 61)** (Circle 3 on rear panel)

Video output connector is a BNC type with a 75  $\Omega$  (ohm) impedance.

- a) Output is NTSC/PAL/RS170A/CCIR baseband from 20 Hz to 5.5 MHz in broadcast mode and 20 HZ to 4.0 MHz in reference mode.
- a) Output amplitude is 1 Vp.p. with negative sync tips of 0.3 Vp.p.

2.4 Audio Outputs – **Broadcasting (Option 61)** (Circle 2 on rear panel)

Audio output is through a 5 pin connector located on the rear panel.

Pin 1 – Audio Return

Pin 2 – Audio 1 Output

Pin 3 – No Connection

Pin 4 – RS232 Return

Pin 5 – RS232 Input

LEMO ECG.0B.305.CLN  
or Equivalent



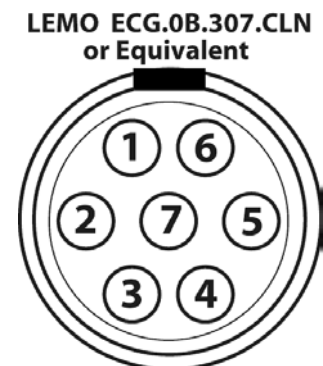
Figure E – Audio Output(s)

2.5 Digital Wireless Link Data Input – **Broadcasting (Option 61)**  
(Circle 4 on rear panel).

The digital wireless link input connector is a LEMO type ECG.0B.307.CLN or equivalent:

The connector pin-out is:

- Pin 1 – Ground
- Pin 2 – Microphone input – Optional
- Pin 3 – Speaker output – Optional
- Pin 4 – Microphone Bias Output – Optional
- Pin 5 – RS485 I/O “A” Input
- Pin 6 – RS485 I/O “B” Input
- Pin 7 – Ground



**Figure F – Digital  
Wireless Link Data  
Input**

2.6 Wireless Digital Link (WDL) Antenna (Circle 6 of Front Panel)

- a) The antenna output is a MCX antenna with 50  $\Omega$  (ohm) impedance.
- b) The DX602 WDL operating frequency range is 300MHz to 1000MHz.

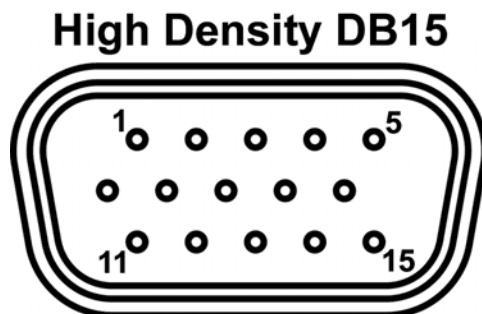
**NOTE**

For operation in the USA, the WDL is preset for operation at 433.2MHz.

- c) Maximum transmitter output power is 10mW at 433.2MHz.

2.7 Interface - **Security Version** (Figure C, circle 6).

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



**Figure G – Interface - Security Version**

Pin #	Function	Pin #	Function
1	Power Input	9	Signal Ground
2	Video Output	10	Telemetry 1 Output
3	Video Return Ground	11	Alarm Output
4	Audio 1 Output	12	RS-485 I/O 'A'
5	Microphone Input	13	RS-485 I/O 'B'
6	Microphone Bias	14	Telemetry 2 Output
7	RS232 Input	15	Telemetry 3 Output
8	Power Return Ground		

2.7.1 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.

2.7.2 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.)

### 2.7.3 Audio Output (pins 4 and 3) ..

The DX602 audio outputs 1V(rms) into a 600 load impedance.

### 2.7.4 Audio talk back (pins 5, 6 and 9).

The DX602 audio talk back channel has a 100Hz-3.4KHz frequency response and built-in automatic gain control. It is compatible with an Electret microphone with separate microphone bias.

The DX602 audio talk back is compatible with the TX623/TX630

### 2.7.5 Wireless Data Link (WDL) (pins 12 and 13). .)

The WDL is a RS485 half duplex communication link capable of baud rates of from 1200 baud to 19.2Kbaud.

The DX602 WDL is compatible with a TX623/TX630

### 2.7.6 Alarm Output (pin 11 and pin 9).

The Alarm output is a dry relay output capable of driving a resistive load limited to 24V and 1A. It is normally open.

The DX602 alarm is compatible with a TX623/TX630.

### 2.7.7 Telemetry Output (pins 10, 14 and 15). .

The DX602 has three telemetry outputs. Each output has a voltage swing of 0V to 1V and an output impedance of 1Kohm with a 0.01uF capacitor to filter high frequency noise.

The DX602 telemetry is compatible with a TX623/TX630

### 2.7.8 RS232 Input (pin 7 to pin 9).

The DX602 RS232 input is used to tune the receiver from a remote computer. It is an asynchronous link operating at 9600 baud, 8 bits, no parity, ASCII encoded per protocol described in Appendix A.

## 2.8 Size

Configuration	Dimensions
DX602 (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.*

## 2.9 Weight

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

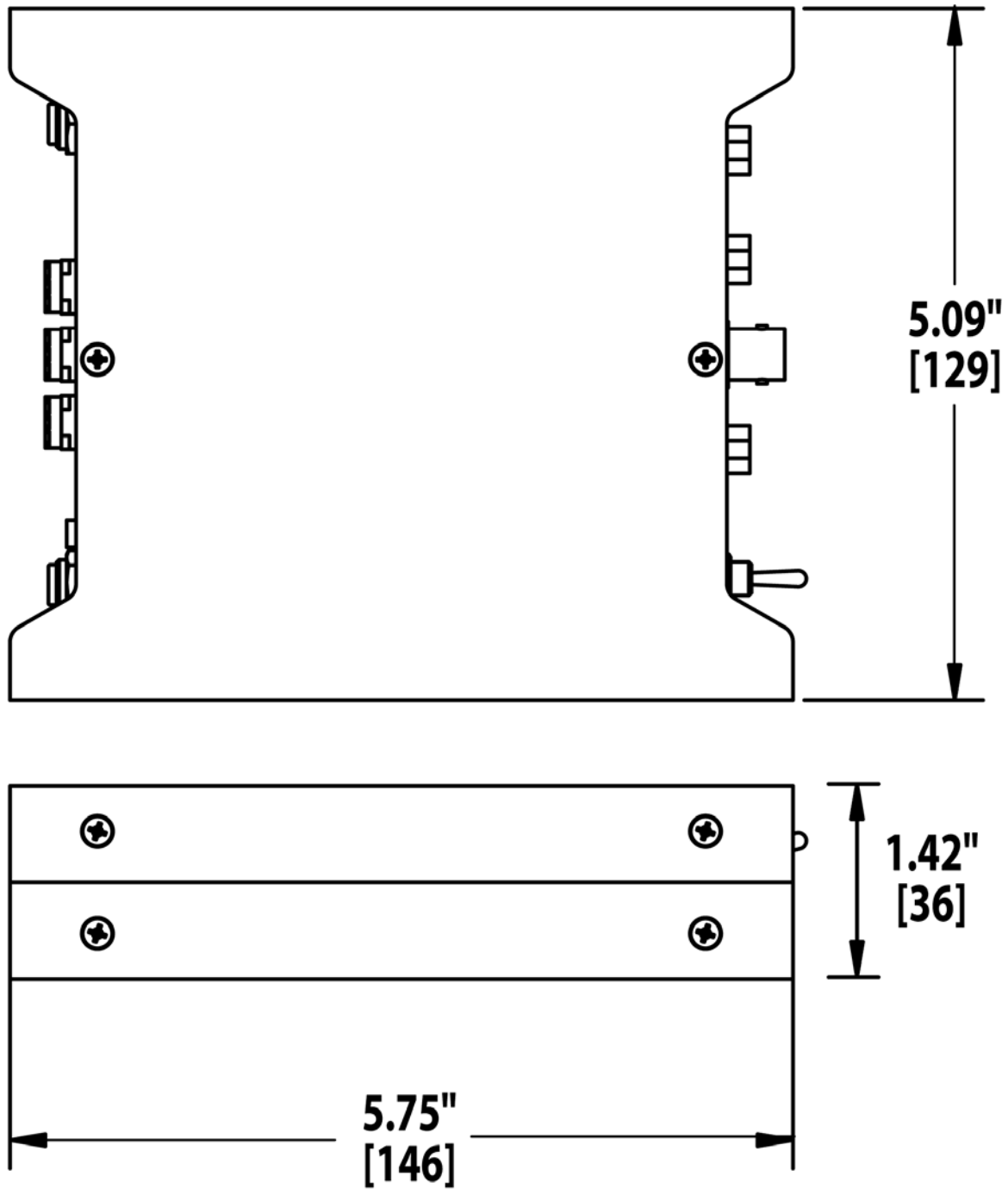


Figure H – DX602 Mechanical Specifications - Inches [mm]

## 2.10 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 via front panel rotary switches (Circles 3,4,5 on figure A).

###### a) DX402

The DX402 can be tuned:

Channel number (2-69)	902-969 on switches
Frequency in MHz	056-802 (first digit not "9").
Auto synt.	C51-FFF

###### b) DX502

The DX502 is tuned to a carrier frequency, encoded as follows:

900MHz to 999MHz	A00-A99 on switches
1000MHz to 1999MHz	000-999
2000MHz to 2099MHz	B00-B99
2100MHz to 2150MHz	C00-C50
EIN numbers for auto synt.	C51-FFF

###### c) DX602

2150MHz to 2500MHz	150-500 on switches
EIN numbers for auto synt.	C51-FFF

### **3. Operating Instructions (continued).**

#### 3.2.2 Tuning (continued).

- d) Remotely via the RS232 interface (Optional).  
Consult Appendix A.
- e) Self tuning via the auto synthesizing function (Optional).

If the front panel switches are set to values between C51 and FFF (That's about 700 combinations), the DX602 and its corresponding TX623/TX630 will look for the first available channel in a predefined list of channels.

## 4. Ordering Information

**DX402 – Basic System**

**DX502 – Basic System**

**DX602 – Basic System**

Every DX602 comes with the following standard features and accessories.

- 4.1 One DX402 or DX502 or DX602 in a ZIPLOCK ESD bag.

The receiver has one video and one audio 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 A warranty card.
- 4.5 One reusable carton with foam lining.

#### 4.6 **Optional features:**

- |            |  |
|------------|--|
| Option 00  | European version.<br>Includes a 230VAC power adapter and calibration for PAL.  |
| Option 01  | Remote programming.<br>Includes the RS232 interface. Consult Appendix A for programming instructions.  |
| Option 02  | Remote synthesizing<br>This option automatically changes the operating frequency of a TX630 companion transmitter to match the change in tuning frequency of its DX602. It requires Option 11. |
| Option 04  | Extended tuning range (DX502 & DX602 only)<br>DX502 – 900MHz to 2.150GHz<br>DX602 - 2.150GHz to 2.500GHz   |
| Option 11  | Two way serial communication channel.  |
| Option 31  | Audio talk back input  |
| Option 41  | Alarm output   |
| Option 51  | Telemetry output.  |
| Option 61  | Broadcasting version (with Lemo connectors)  |
| Option 99  | Power to an external LNA (DX502 Only).   |
| Option R3  | Rack mount kit to mount 3 DX602 in a rack.   |
| Option R10 | Rack mount kit to mount 10 DX602 in a rack.<br>Includes a 110/230VAC to 12V/10A L.V.P.S.   |
| Option PC  | Bracket to mount DX602 in an IBM/PC  |

## 4.7 Optional accessories

### 4.7.1 Antennas.

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

Ordering information:

Description		DX402	DX502	DX602
2dbi	Omnidirectional	AX402	AX502	AX602
2dbi	omni circular polarized			AX602R
5dbi	Omnidirectional	AX405	AX505	AX605
6dbi	hemispheric patch	AX406	AX506	
9.5dbi	panel antenna			AX609
10dbi	circular polarized(RH) patch			AX610R
10dbi	circular polarized(LH) patch			AX610L
11dbi	log periodic antenna	AX411		
13dbi	panel antenna		AX513	AX613
15dbi	panel antenna			AX615
18dbi	panel antenna			AX618
24dbi	parabolic antenna			AX624

### 4.7.2 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 20ft to 50ft.

Ordering Information:

Length	DX402/DX502 F-F/75Ω (ohm)	DX602 N-SMA/50Ω (ohm)
5'	CBLFF-5	CBLNS-5
15'	CBLFF-15	CBLNS-15
30'	CBLFF-30	CBLNS-30
50'	CBLFF-50	CBLNS-50

### 4.7.3 Antenna cables for the Wireless Digital Link (WDL)

The WDL antenna cable is a MCX to BNC 50 OHM cable.

### 4.7.4 Splitters

When a set of four antennas feeds more than one receiver, it is convenient to split the signal from each antenna to all receivers at the same location.

Ordering information:

Splitter type	DX402/DX502 (F-F)	DX602 (SMA-SMA)
1 to 2 (two DX..2)	SP2F	SP2S
1 to 3 (three DX..2)	SP3F	SP3S
1 to 4 (four DX..2)	SP4F	SP3S
1 to 8 (eight DX..2)	SP8F	SP8S

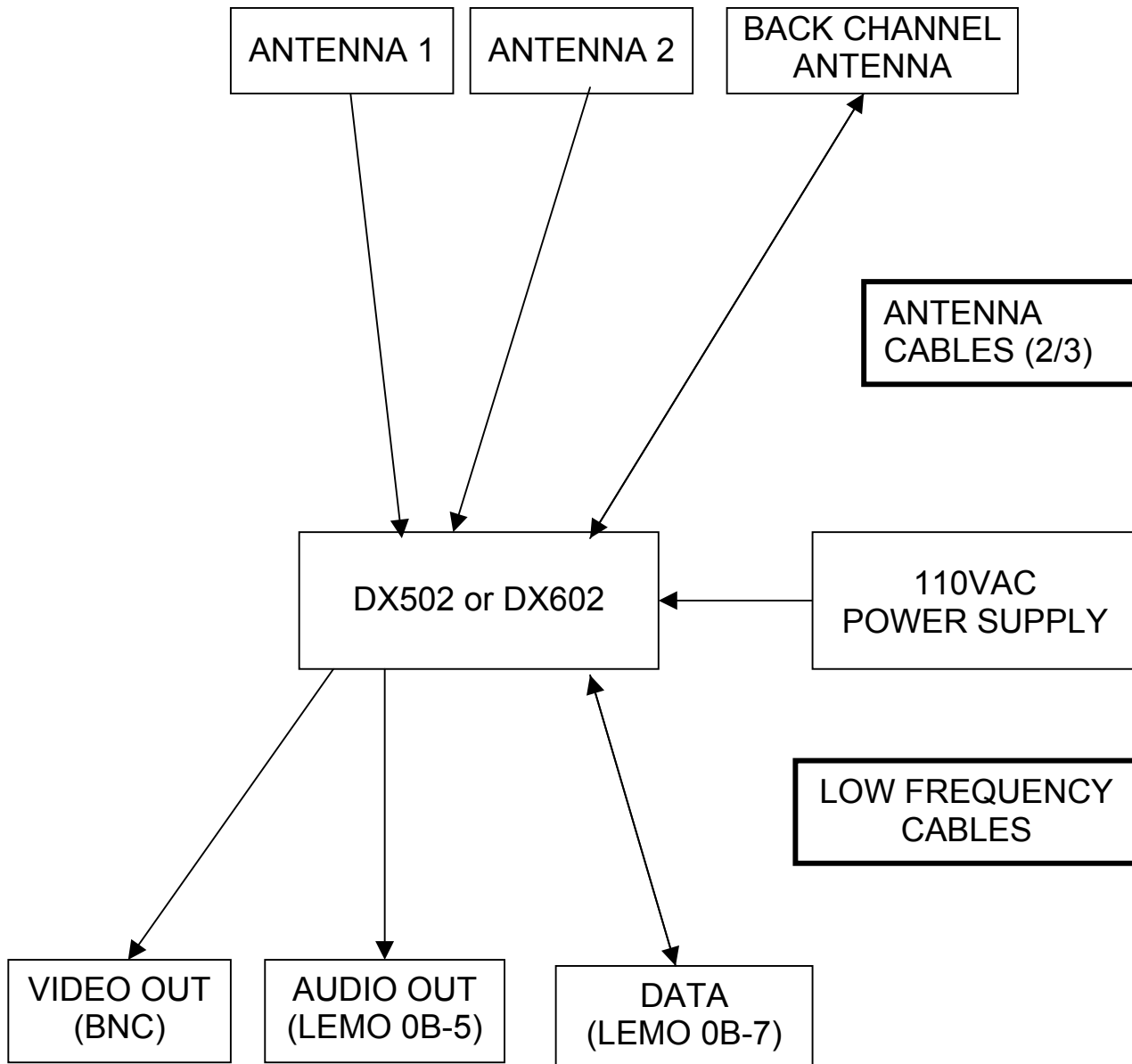
### 4.7.5 Splitter to receiver cables.

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

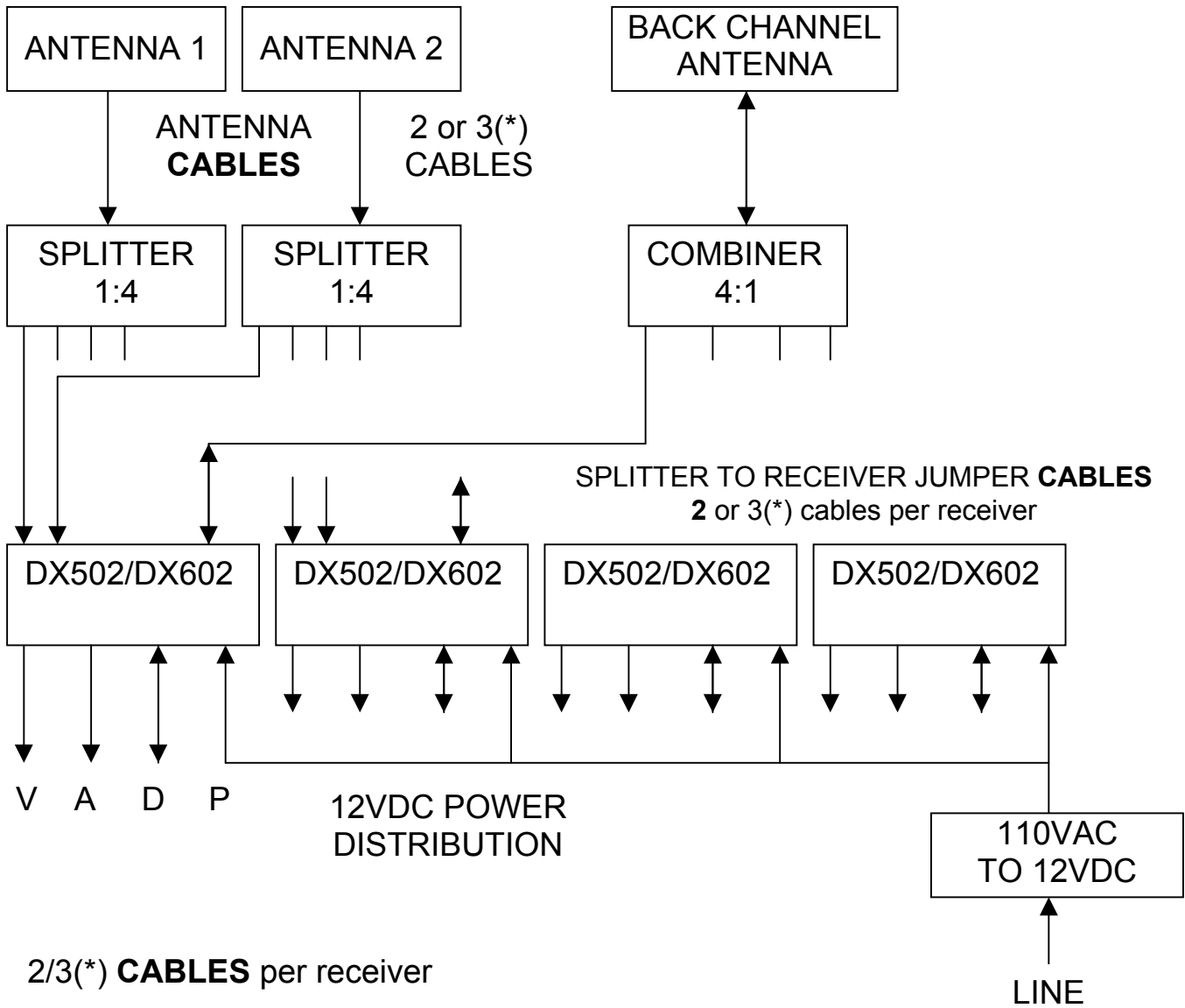
Number of DX..2 Receivers	Number of cables	DX402/DX502	DX602
2	8	CBLFF-2	CBLSS-2
3	12	CBLFF-2	CBLSS-2
4	16	CBLFF-2	CBLSS-2

### 4.7.6 Wireless Digital Link (WDL) combiner cables.

A RF signal combiner feeds one DWL antenna and antenna cable from is used to drive the DWL signals from more than one DX..2 receiver to a single DWL antenna and antenna cable.



**Figure I – Block Diagram of Basic System with a Single DX402/DX502/DX602 Receiver**



2/3(\*) CABLES per receiver

(\*) With BACK CHANNEL

**Figure J – Block Diagram of System with Four DX402/DX502/DX602 Receivers**

## Appendix A – Remote Programming Option

### 1. Interface.

The DX402/DX502/DX602 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.

### 2. Protocol.

<Frequency> <CR> where frequency is any frequency in the tuning range of the receiver in increments of 250KHz.

E.G.: DX602 -> 2400 <CR> will tune in to 2400MHz  
2413.25 <CR> will tune in to 2413.25MHz