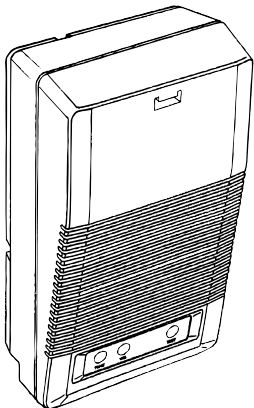# ALGO

1825 Duet Plus
Installation Guide

Algo Communication Products Ltd.
www.algosolutions.com
90-00046B

Table of Contents

Release 2 Updates - Feb. 2012

The 1825 Duet Plus ringer has been updated for 2012. All features of the original Duet Plus are maintained and the same inputs and outputs are provided. The following lists the most important changes affecting installers:

AUDIO INPUT	The audio input still functions as before for dry paging input and audio detection for loud ring with heritage Nortel telephones. However, the input is now rated to carry DC current up to 65 mA and may be connected directly to an Avaya IP Office FXS port for "wet" paging. Also, if the J2 shunt is not set to PAG then the amplifier is disabled, except when ringing. The shunt position is checked each time ringing is initiated. The audio input is not intended to be connected to CO lines or wiring leaving a building.
TEL TIP & RING	The input from a telephone CO line or FXS port has been moved from the internal terminal block to an internal RJ11 jack. If the Duet Plus is used in an application involving telephone ring detect then a safety approved (CSA, UL, CE, A-Tick) modular cable will be required for connection (not supplied).
POWER SUPPLY	The power supply provided with the Duet Plus is now a regulated high efficiency 24V switch mode power supply with energy level V compliance.
LED INDICATORS	Two LEDs are now located on the PCB. A green LED indicates power and a red LED indicates power limiting. These are to help installers and Algo's support team in the event that any troubleshooting is required. If an over-current condition is detected then the 1825 automatically reduces audio level to maintain current at a safe operating level.

Quick Install for Dry Contact Ringing

Step 1	Mount the unit and connect power to the 24 VDC terminals. The power supply is usually located in the equipment room with power and control contacts provided through separate pairs in the cable from the equipment room.
Step 2	Press the test button (bottom right of unit). The warble should be heard on the speaker. Adjust volume and tone to suit (bottom left of unit).
Step 3	Connect telephone system night bell or auxiliary ring contacts to RELAY terminals.
Step 4	If loud or outdoor ringing is required then connect an 8 Ω speaker such as the 1185 to the SPKR terminals. The internal speaker may be disabled by removing the SPK shunt (see "Inside Diagram" on page 8).
	Note that the auxiliary speaker should not be located beyond the perimeter of the building. No lightning protection is provided on the SPKR outputs.
Step 5	Close cabinet and test.

About the Duet Plus

The Duet Plus is an auxiliary ringer compatible with most business telephone equipment and includes an audio amplifier for ring amplification or voice paging.

Mounting

The Duet Plus must be mounted in a dry indoor location. Outdoor locations can be alerted with an external water proof horn speaker such as the Algo 1185 (See "Duet Plus Accessories" on page 32.)

The Duet Plus cabinet is opened by inserting a screwdriver into the slot near the top of the cover and prying gently upwards while lifting the cover.

Once open, the unit can be wall mounted with wood screws using the two slot holes in the back.

Wiring

Connections to the Duet Plus are made at the PC Board mounted terminal strip inside the unit. In many cases, connections will be made to only a few of the terminals, and those connections depend entirely on the application. The Duet Plus can be installed so that wiring is hidden by entering through the back of the cabinet from a mud ring, dedicated electrical box, or wall opening. For surface wired applications, wire can enter from the top, bottom, or left side.

The power supply is often located in an equipment room and wired to a Duet Plus using one pair of

a 3 or 4 pair 24 AWG station cable. That leaves additional pairs for dry contact closure and/or paging audio from the telephone equipment.

Wiring to 8 Ω speakers should be low resistance for maximum audio power. If extra wire pairs are available, make use of them to reduce speaker wiring resistance. When an auxiliary speaker is used, the wiring is normally routed from a Duet Plus directly to the speaker using the shortest distance possible.

Refer to input and output circuit descriptions and application examples for specific wiring connection information.

Inputs and Outputs

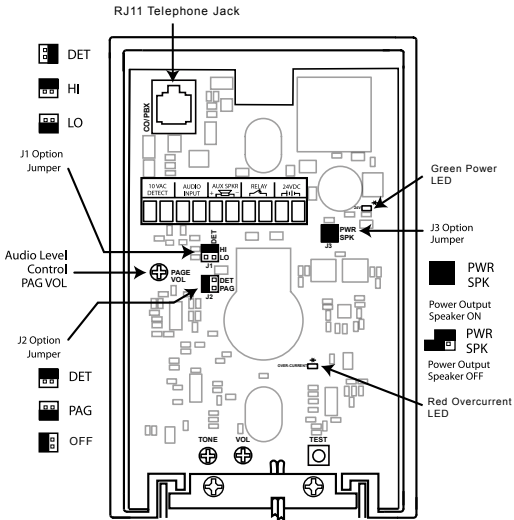| Connection	I/O	Description/Function
24VDC	Input	Power supply input. 12 to 27 volts DC, polarity insensitive. Maximum current with internal speaker 160 mA, with typical 8 Ω horn speaker 500 mA.
RELAY	Input	Trigger circuit to detect dry contact closure for connection to auxiliary ringing or night bell contacts (normally open).
SPKR	Output	Output to loud speaker for full power performance. Provides both warble and amplified audio. This output can be selected at shunt J3 for high impedance output (10 kΩ) for connection to slave amplifiers.
AUDIO INPUT	Input	Balanced 600 Ω input for voice paging or ring amplification. Maximum 65 mA DC.
10 VAC DETECT	Input	Trigger circuit detecting foreign voltage. Isolated input detects 3 to 30 volts DC or AC. Input impedance approximately 4 kΩ.
RJ11 Telephone Jack	Input	Trigger circuit detecting 20 to 150 VAC 16 to 68 Hz ring signals from CO line or PBX station tip and ring. Input uses RJ11 jack located internally.

Inside Diagram

RJ11 Telephone Jack

DET

HI

LO

J1 Option Jumper

Audio Level Control PAG VOL

J2 Option Jumper

DET

PAG

OFF

CO/PBX

10 VAC DETECT | AUDIO INPUT | AUX SPKR | RELAY | 24VDC

HI
LO
J1

PAGE VOL

DET PAG
J2

TONE   VOL   TEST

Green Power LED

PWR
SPK
J3

J3 Option Jumper

PWR
SPK
Power Output Speaker ON

PWR
SPK
Power Output Speaker OFF

OVER-CURRENT

Red Overcurrent LED

Fig. 1 - Inside Diagram of the Duet Plus

Option Jumpers

J1	HI	High level input paging signal (0 to +12 dBm)
	LO	Low level input paging signal (-18 to 0 dBm)
	DET	Maximum gain for very low input levels. Use for audio detection application only.
J2	DET	Audio input signal routed to detection circuit.
	PAG	Audio input signal routed to amplifier.
	OFF	Audio input disabled (Shunt on left posts).
J3	PWR	Speaker output provided directly when shunt in. With shunt out, signal is provided through 10 kΩ resistor.
	SPK	When in, connects internal speaker.

If the audio input feature is not being used, then it is recommended that the J2 shunt be positioned on the two left posts as shown above (for OFF). This will provide the lowest idle speaker noise and prevent unintentional activation of the warble. If the PAG shunt is in the OFF position, the speaker amplifier is disabled, except when ringing. The PAG shunt is checked each time warble begins so if moving the PAG shunt, press the TEST button momentarily to update settings.
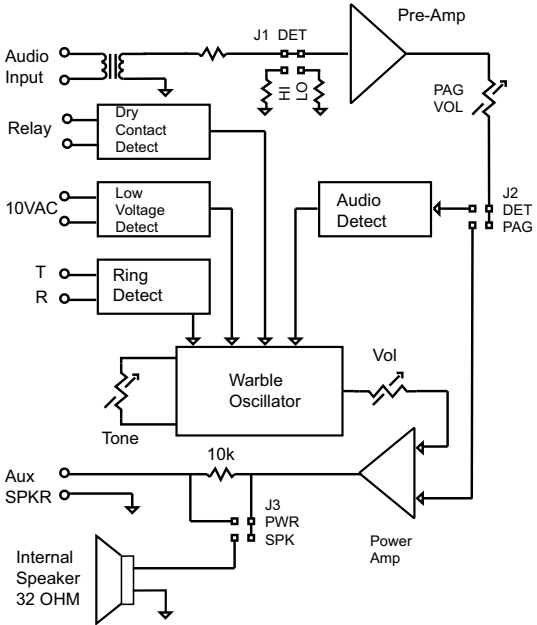
Block Diagram

Fig. 2 - Block Diagram of the Duet Plus

All inputs (including power) are polarity insensitive.

Duet Plus Specifications

	Min	Typ	Max	Unit
Supply Voltage	12	24	26.9	Vdc
Supply Current				
(using internal speaker)			160	mA
(8 Ω load at 9 W)			500	mA
(16 Ω load at 5 W)			400	mA
Output power to auxiliary speaker (no clipping)			6.0	Watts
Dry contact closure detection				
Contact and loop resistance	0		2	kΩ
Open circuit voltage			5	Vdc
Loop current	1		10	mA
Low voltage detection circuit				
Input impedance		4		kΩ
DC voltage input range	3		30	Vdc
AC voltage input range	3		30	Vrms
Telephone ring detection				
Ring detect voltage 20/25 Hz		20		Vrms
Input impedance	50			kΩ
Audio/Paging input				
Input impedance		600		Ω
Page input level (HI)		0		dBm
Page input level (LO)		-18		dBm
Audio detection level	- 43		+12	dBm
Output sound pressure at 1 m				
Internal speaker only			93	dBA
Typical 8 Ω horn speaker			112	dBA
Output warble frequency				
High tone	360		960	Hz
Low tone	290		770	Hz
Modulation	4		12	Hz
Operating temperature	0°		40°	C

Note: Specifications are subject to change without notice.

Applications

Dry Contact Office Ringer

This application represents the most common application for the Duet Plus. The night bell or auxiliary ring contacts (make and common) are connected to the RELAY terminals of the Duet Plus. Whenever the contacts operate, the Duet Plus will provide a warble sound from the internal speaker. Volume and warble tone are adjustable.

To help in setting volume and tone, the TEST button can be used to activate the Duet Plus. If multiple units were connected to the same contacts, then the TEST button would only activate the particular unit being tested. When more than one unit is connected to the same contacts then it is necessary to ensure that all RELAY circuits are wired in the same polarity to prevent mutual activation.

This application is used for offices, quiet warehouses, and common areas. The power supply can be located in an equipment room and provided to the Duet Plus through the same cabling as the control contacts.

Note that the warble volume cannot be turned completely off so that accidental adjustment is not mistakenly considered to be a product failure.
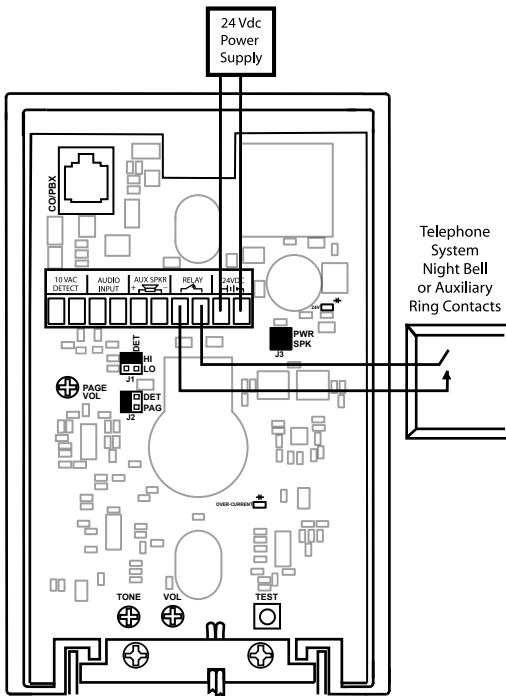
Fig. 3 - Dry Contact Office Ringer

Loud or Outdoor Dry Contact Ringer

In this application, an 8 Ω horn speaker has been added for significant improvement in output volume. The Duet Plus can provide more power than the internal speaker is capable of handling. Only 25% of the available power is provided to the internal speaker. The SPKR terminals provide access to 100% of the power.

For outdoor applications, a weatherproof horn speaker (such as Algo's 1185) can be mounted on an outside wall, while the Duet Plus is located safely indoors. Besides keeping the Duet Plus dry, this also makes tone and volume adjustment or other maintenance easier.

The internal speaker may be left in use or disconnected depending on option shunt J3 (SPK). If the shunt is on, then the internal speaker is enabled. Remove the shunt (park it on one pin only) to disable the speaker.

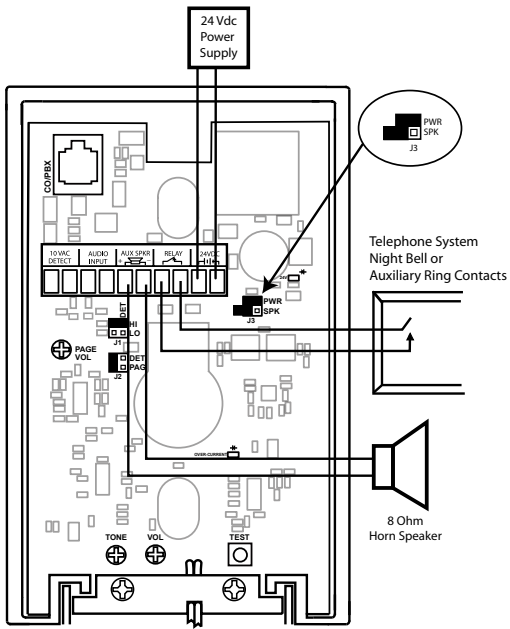The TEST button will activate the warble through the horn speaker.

Fig. 4 - Loud or Outdoor Dry Contact Ringer

Loud Ringer and Paging

Once a Duet Plus has been successfully installed as a loud ringer with external speaker, the option is available to add voice paging without any requirement for additional equipment. Simply connect the dry or wet page port from the telephone system to the AUDIO INPUT terminals of the Duet Plus. Now the Duet Plus will provide loud ringing and paging through the same speaker.

From the equipment room, a three-pair cable can provide power supply, dry contacts for ringing, and paging audio. For maximum output power, minimize wiring resistance between the Duet Plus and the speaker. If telephone wire is used, use all available conductors for power to minimize resistance.

The warble tone and volume are adjusted as for the previous application. The paging volume may be set independently using the PAG VOL control on the left side of the PC Board about midway between top and bottom.

With a typical 8 Ω horn speaker, a Duet Plus will provide sufficient ring and paging volume for average ambient noise warehouses up to 10,000 square feet (930 square meters).
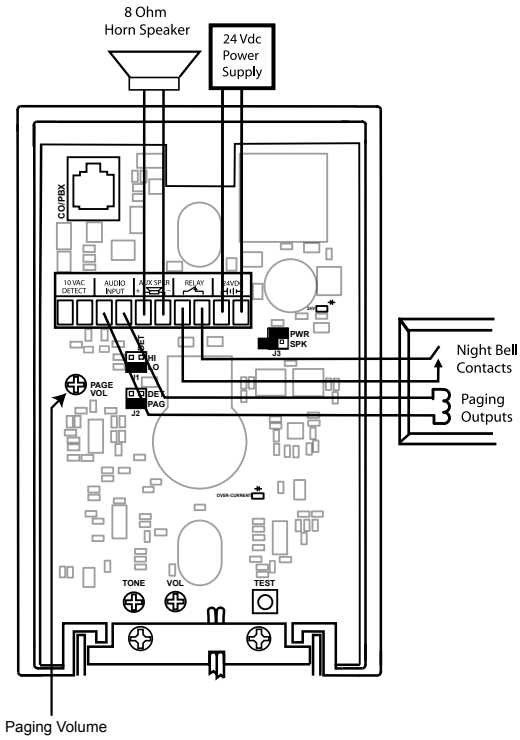
Fig. 5 - Loud Ringer and Paging

Nortel/Avaya Digital Station Set Ringer

A Duet Plus can be configured to detect audio signal and activate warble tones when a particular threshold is reached. The most common application of this feature is to detect the ringing on Nortel/Avaya TDM phones that provide ring signal to the headset jack.

Option shunt J1 and J2 are set to DET (detect) mode and the monitored audio connected to the AUDIO INPUT terminals. The PAG VOL control now adjusts detection sensitivity.

Due to the high sensitivity required for ring detection using the headset jack, the wiring between the station set and a Duet Plus should not exceed more than several feet. In all cases, adjust the station set ring volume as high as possible, and then adjust the Duet Plus sensitivity for threshold plus a 1/8 turn clockwise. Too much sensitivity in electrically noisy environments can cause false ringing.

Telephones that support this feature include:

- M3900 series TDM sets for M1 and CS1000
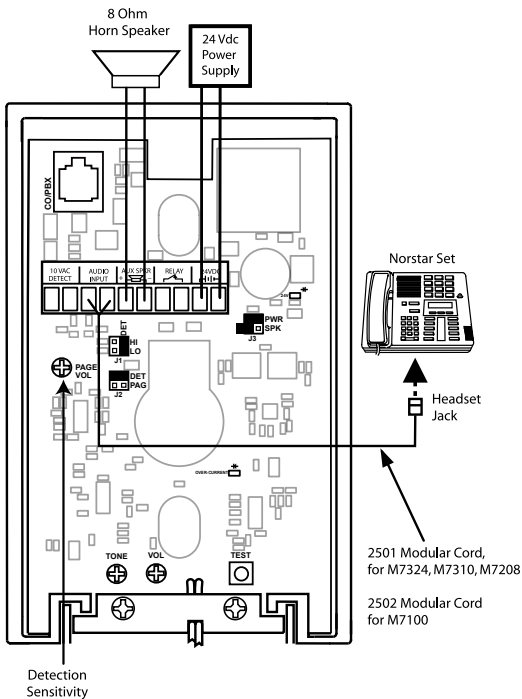- M7000 series TDM sets for Norstar, BCM, and IP Office

Fig. 6 - Nortel/Avaya Digital Station Set Ringer

Visual Alerting

A Duet Plus can provide a visual indication of ringing by the connection of an Algo 1126 Strobe or 1127 Visual Alerter to the SPKR terminals. Whenever the Duet Plus is activated, the strobe or alerter will activate. The most common application is for visual alerting in environments that are either exceptionally noisy or require noise-free alerting.

When the Duet Plus warble had been activated the speaker output can be used to activate the strobe or visual alerter.
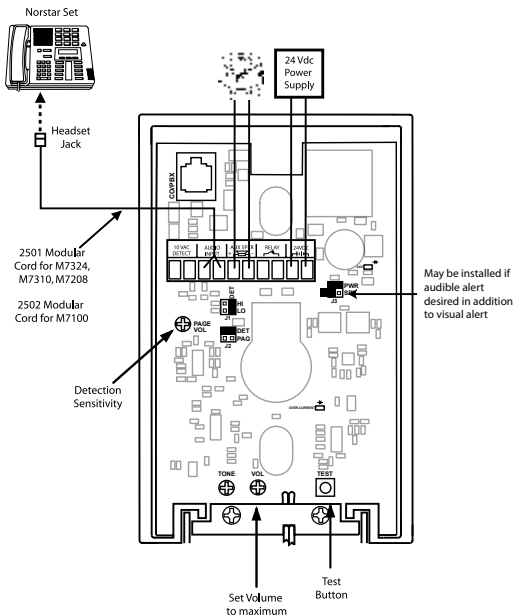
Norstar Set

Headset Jack

2501 Modular Cord for M7324, M7310, M7208

2502 Modular Cord for M7100

Detection Sensitivity

24 Vdc Power Supply

May be installed if audible alert desired in addition to visual alert

Set Volume to maximum

Test Button

Fig. 7 - Visual Alerting

Connecting to a Paging Amplifier

The output of the Duet Plus (SPKR) can be connected to a paging amplifier to send the warble tone through to existing speakers. This application is advantageous when speakers already exist in locations where ringing is desired.

The J3 Option Jumper includes a position marked "PWR". Pull the J3 PWR shunt for this application. When the shunt remains installed, the SPKR output is connected directly from the Duet Plus amplifier. When the shunt is pulled, the SPKR output is provided through a 10 kΩ resistor.

Into a 600 Ω load, the Duet Plus can now deliver a maximum of about 3 dBm signal with good signal-to-noise performance. The output of the Duet Plus when high impedance can parallel an existing connection between a telephone system page port and amplifier.

> ⚠ *Ensure that the Duet Plus is operating from a ground isolated power supply as provided by Algo to avoid ground loops with the paging amplifier or telephone system.*
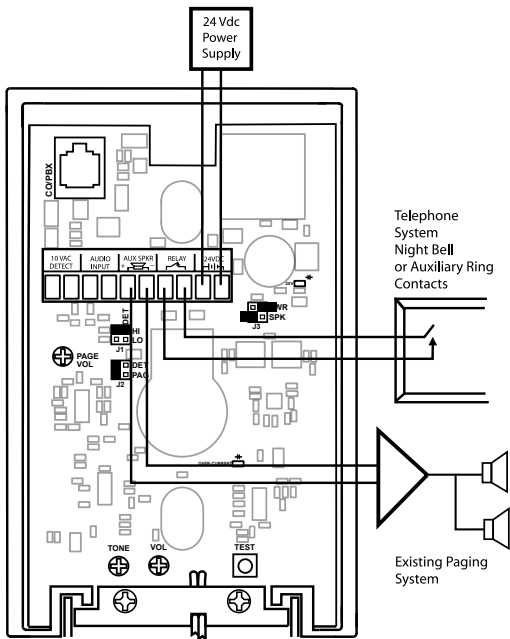
Fig. 8 - Connecting to a Paging Amplifier

CO or FXS Port Loud Ringing

The telephone ring detection circuit is used behind FXS (analog station ports or ATAs) as well as for direct connection to CO (Central Office) telephone lines. Connection is made to the internal RJ11 jack.

The following example shows the Duet Plus functioning as a loud ringer connected to an FXS port and also a page port from the telephone system (dry or wet).
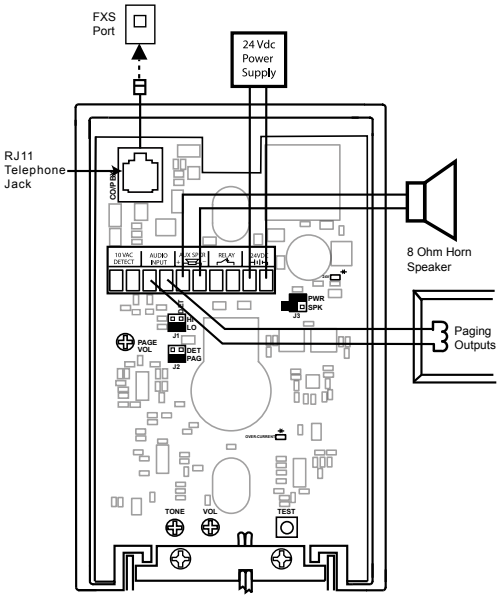
FXS Port

24 Vdc Power Supply

RJ11 Telephone Jack

CO/FXS

10 VAC DETECT

AUDIO INPUT

24 SPK

RELAY

GND PWD

8 Ohm Horn Speaker

PWR SPK

J3

HI LO J1

DET PAG J2

PAGE VOL

Paging Outputs

OVER CURRENT

TONE   VOL   TEST

Fig. 9 - CO or FXS Port Loud Ringing and Paging

Multiple Speakers

How many speakers may be attached to the Duet Plus?

The answer depends on the power required, speaker impedance, and wiring resistance. The Duet Plus was intended for ONE speaker, typically a horn speaker located on a warehouse, machine shop, or outdoors or a wall baffle cone speaker for quieter indoor areas. This assumes of course that the speaker in the Duet Plus does not provide sufficient volume for the application.

The Duet Plus is fully protected against short circuits and will automatically reduce output power if the output is set too high for the speaker load impedance.

The facing diagrams show maximum warble power capability with 8 Ω speakers, 24 Vdc power supply, and no wiring losses. Output capability is reduced by approximately 30% for voice paging to avoid clipping.

Wiring resistance is critical with low impedance loads such as 8 Ω speakers, and even more critical with 4 Ω loads (two speakers in parallel). With a 4 Ω load, 50% of the power is lost after 75 feet (23 m) of 24 gauge wire. Use any available spare wires in parallel to reduce resistance.
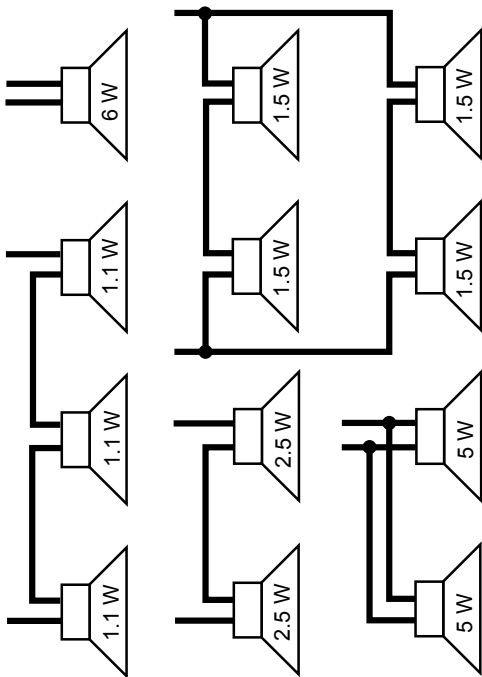
Fig. 10 - Speaker Wiring Arrangements and Typical Output Power

The above power values are typical and assume no wiring losses.

Application Tips & Recommendations

- The Duet Plus will provide enough ring volume for most office environments. In fact, the Duet Plus is often used in warehouses and noisy locations without external speakers. For LOUD ringing, connect an 8 Ω speaker to the SPKR terminals. The Duet Plus does not provide maximum power to the internal speaker.

- The Duet Plus contains a protective device that clamps all power supply voltages above 27 V. The power supply provided by Algo was selected specifically for the Duet Plus but if an alternate power supply is used, ensure that it does not supply more than 27 V at a load of 50 mA.

- More than one Duet Plus may share a common set of dry contacts for activation. The detection circuit was specifically designed for maximum life of the control contacts and up to 50 units could safely share contacts. Also, the test button was designed to trigger only the unit being tested to permit singular testing. BUT if the relay terminals on two or more Duet Plus units are wired such that they are reverse to each other, then two or more units will warble continuously. Connect the units one at a time to avoid this condition and maintain similar polarity.

- If a Duet Plus is mounted over a drywall mounting plate that protrudes above the wall surface, then the ribs on the bottom of the Duet Plus by the mounting holes may be cut to provide a flush fit around the perimeter of the Duet Plus. Normally, the extended ribs prevent the plastic case from being deformed by over-tightening the mounting screws.

- When shunts are pulled from the option jumpers, such as the SPK shunt to disable the internal speaker, park the shunt back on one pin only so that the shunt is not lost if the speaker ever needs to be activated.

- If the Audio input feature is not being used, place the J2 shunt in the OFF position. This will reduce idle power and speaker white noise.

- For audio paging applications, better audio performance will be obtained with J1 in the LO position. The J1 HI position is intended for use with high input signal levels and provides input signal attenuation. The J1 LO position provides less input attenuation and therefore requires less gain from the amplifier to reach high output levels to the speaker.

Warranty and Repair

The Duet Plus is warranted to be free of defects in material and workmanship for a period of 18 months from the date of manufacture. A label on the back of the unit identifies the manufacture code in a year and week format (i.e. 1203 for the third week of 2012).

To return a product to Algo for repair, please contact the repair center for a Ticket Number and instructions prior to shipment. All product returned for repair should be shipped freight prepaid. Product will be returned freight collect for out-of-warranty repair and freight prepaid for warranty repairs in Canada or the USA.
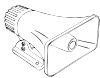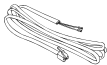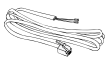
Ship product for repair to:

Algo Communication Products Ltd.
Repair Center
4500 Beedie Street
Burnaby, B.C.
Canada V5J 5L2
Tel: (604) 454-3790
www.algosolutions.com

Outside of Canada and USA, contact Algo for the name of the nearest repair center.

This page intentionally left blank.

Duet Plus Accessories

	1185 Horn Speaker - 8 Ω, 20 Watt horn speaker water-proof white plastic. www.algosolutions.com/1185
	1127 Visual Indicator - A desktop or mountable visual indicator that can be activated by a Duet Plus. www.algosolutions.com/1127
	1126 Strobe Light - Provides visual flash indication when connected to auxiliary speaker terminals of 1825. www.algosolutions.com/1126
	2501 Modular Cord - Connects Audio Input terminals to headset jack.
	2502 Modular Cord - Connects Audio Input terminals to RJ11 telephone line jack.

Related Algo Product

	8180 SIP Audio Alerter - The 8180 SIP Audio Alerter is a SIP compliant PoE network audio device for loud ring and voice paging applications. www.algosolutions.com/8180

ALGO Algo Communication Products Ltd.
4500 Beedie Street
Burnaby, BC Canada V5J 5L2
www.algosolutions.com