

CS520 & W720 WIRELESS HEADSET CABLE ADAPTERS FOR AMATEUR RADIO TRANSCEIVERS

Catalog of Electrical Schematic Diagrams

Created by Gene Hinkle, K5PA

<https://www.k5pa.com>

All drawings, materials, manufacturers, part numbers, assumptions were derived from manufacturers' equipment manuals and following best engineering practice. However, there is no implied warranty that the information present is free from error and the user of this information should validate its accuracy and usage in their intended applications.

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4000-0056	--	FT991A or FT857D to CS520/W720 with Wireless PTT	12/8/2019
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Refer to All Notes on the Next Page

TABLE NOTES

Note 1, Suitability to Applications. All drawings, materials, manufacturers, part numbers, assumptions were derived from manufacturers' equipment manuals and following best engineering practice. However, there is no implied warranty that the information present is free from error and the user of this information should validate its accuracy and usage in their intended applications.

Note 2, Adaptability. Different radio manufacturers sometimes use similar microphone and headphone interfaces, especially for the common microphone connections, push-to-talk (PTT), and ground. Some manufacturers also bring the audio output line(s) out the microphone connector. Therefore, it is worth looking at a new radio requirement to see if any of the existing drawings match the pins of the microphone connector. In that case, if the other pin functions are not needed, then the current drawing can be adapted.

Note 3, Dual Watch Operation. Many advanced transceivers have dual receiver capabilities or dual watch that permits listening on two different radio frequencies at the same time. This is used to monitor a 2nd channel or to work split when working a DX pileup. Each of the audio channels will be connected to its own output connector or a common connector with multiple pins. Commonly used is the Tip-Ring-Sleeve (TRS) 1/4" or 1/8" phone plug to route these two receiver audio output paths. The CS520 is only a mono audio wireless headset so a dual channel mixer is needed to combine the two audio channels into one. This is the purpose of the summing circuit using the two resistors in the audio path. There is also a separate audio cable that combines the two channels into one (refer to Drawing 4000-0020).

Note 4, Bias Voltage. A small DC bias voltage is necessary to provide power to an electret microphone element. Since the CS520 does not require this bias voltage, each of the drawings use a DC blocking capacitor in series with the microphone audio lead. This effectively and safely blocks the DC component (depending on the radio manufacturer, normally between 3 and 8 VDC). Radio setup menus sometimes allow a setting to remove the bias voltage for instances where a dynamic microphone element is used that would create a short circuit condition. It is necessary to deselect the bias voltage option if the DC blocking capacitor is not used in the adapter. My belief is the circuit should be robustly designed for the case when the operator inadvertently leaves the DC bias option turned on in the radio's setup menu.

Note 5, Schematic Conventions.

Notes: Drawing notes are in the upper left corner of each drawing. Notes are numbered sequentially, and the numbers are shown inside a triangle on the drawing.

Bill of Materials: A materials list is listed near the lower right of each drawing and are also numbered sequentially. Materials are shown as numbers inside a circle on the drawing. A detailed Bill of Materials is shown after each drawing that includes a hyperlink to the URL address from a vendor. For some parts, an alternate vendor is listed.

Drawing Numbers: Each drawing is given a part number, e.g., 4000-0020 rev-A, where a revision letter or letter number is given. A revision plus number, e.g. A2, is a minor revision to correct a minor change. Major changes are shown by incrementing the drawing revision letter.

DRAWING CONVENTIONS

Drawing Notes

NOTES

1. Cut Item #3 cable to length 36 inches from phone plug end.
2. Use excess cable for connecting to Item #1 cable, 36 inches
3. Cut CAT5e cable to approx. 12 inches from RJ45 end.
4. Must be stereo (T-R-S) plug only (shown as 1/8" but can use 1/4" plug instead. Reference Flex 6000 Series User Manual (ver Version 1.4.11, pg. 39)
5. FT-2000D Operating Manual, Filename: FT-2000D_OM_ERG_EH025H142.pdf
6. FLEX5000 Radio Manual, Version 2.0

Revision History

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	5/16/2017	Initial release
B	5/23/2017	Redesign and cable lengths
C	6/22/2017	Added LEWIS NUMBER
D	6/23/2017	Added FT2000D References
E	6/23/2017	Added FLEX5000 References
ENF	8/16/2017	REPE: Parts List Update, reu-F: Added PTT Circuit.

Materials Item

8-pin Plug
Flex 6000
Series or FT2000D
Transceiver



FLEX 5000 SERIES
USER MANUAL INFO

Table 2: Microphone Connector Pin-Out

Pin #	Signal	Diagram
1	Not Connected	
2	+5 VDC (max 65 mA)	
3	Not Connected	
4	Not Connected	
5	Chassis GND (Shield)	
6	PTT (+)	
7	Mic (-)	
8	Mic (+)	

FLEX 6000 SERIES
USER MANUAL INFO

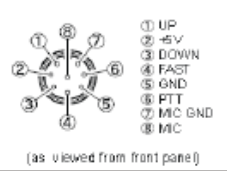
6.1 MICROPHONE JACK

6.1.1 Connector Pinout



FT2000D
USER MANUAL INFO

MIC



Notice: There is no implied warranty that the information present is free from error and the user of this information should validate its accuracy and usage in their intended applications.

Materials List

ITEM	QTY	DESCRIPTION
5	1	1/8" Stereo Phone Extension Cable, CTT to Create Plug and Jack, HOSEA P/N MHE-110
4	1	1/8" Jack to 1/4" plug Stereo Adapter (See Note #4)
R1, R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohm Tolerance 1%, Mouser P/N S88-OD 47 1J E
C1	1	Capacitor, 0.47 uF 50V, X7 R, 10% Source: Jameco S44948, AVX SR305C474KAA
3	1	1/8" Stereo Phone Plug With Cable, CTT Plug End 36" & Excess Cable Used With Item #1.
2	1	Cable Shielded (STP) Network Patch Cable, 8 Jack (10 Ft)
1	1	Foster 8-pin plug connector (Uluu. Radio Inc. #2112) With 36" of Cable (Item #3) Attached

K5PA DESIGN CONCEPTS

FLEX 6000 SERIES OR FT2000D

CABLE TO CS520 WITH

DUAL AUDIO WATCH MONITOR

REV: 4000-0019

DATE: 5/16/2017

1 of 1

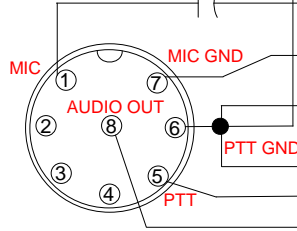
Detailed Bill of Materials Follows Each Drawing

Drawing # and Revision #

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	4/2/2017	Initial release
A1/A2	8/16/2017	Parts List Update

SEE TEXT IN CQ
MAGAZINE ARTICLE
USED TO
BLOCK DC BIAS
ON MIC PIN

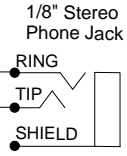
C1
DC BLOCK
C1, 0.47 uF, 50 VDC



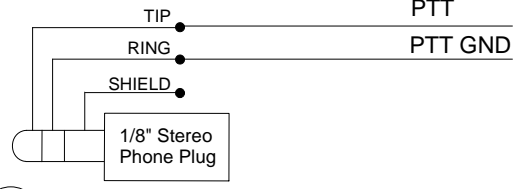
Rear View of Foster
Connector Plug
View of Plug's
Solder Terminals

**8-pin Plug
ICOM 756/7300/7600
for Transceiver**

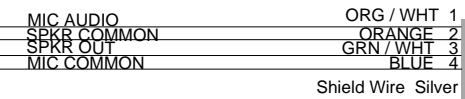
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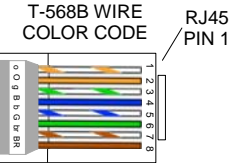
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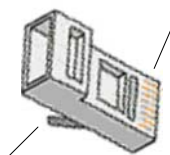
CONNECT
TOGETHER TO
INVOKES PTT
TRANSMIT



RJ45 PLUGS
INTO CS520
BASE UNIT



2



HOOK UNDERNEATH

ITEM	QTY	DESCRIPTION
3	1	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet. Cut to Make Cable for PTT Connection.
2	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft)
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
1	1	Foster 8-pin plug connector for ICOM (Univ. Radio Inc. #2112)

K5PA DESIGN CONCEPTS

TITLE
ICOM CABLE TO CS520

SIZE A2	CAGE CODE	DWG NO 4000-0018	REV A2
SCALE	SHEET 1 of 1		

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

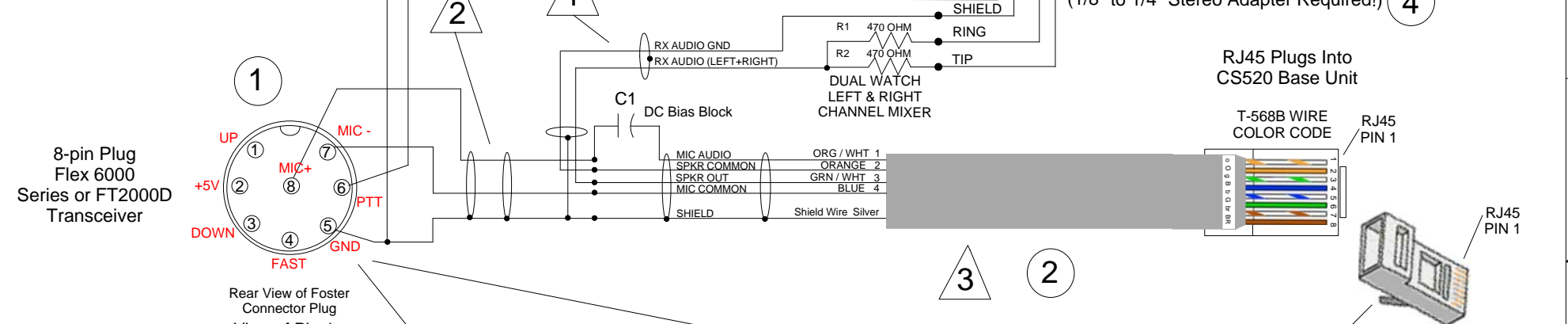
Date: 8/16/2017

Bill of Materials Drawing 4000-0018 rev-A2

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.universal-radio.com/)	2112	1
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
2	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
3	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1

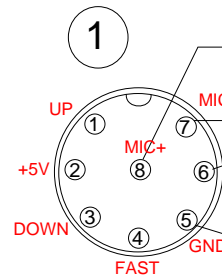
NOTES

1. Cut Item #3 cable to length 36 inches from phone plug end.
2. Use excess cable for connecting to Item #1 cable, 36 inches.
3. Cut CAT5e cable to approx. 12 inches from RJ45 end.
4. Must be stereo (T-R-S) plug only! Shown as 1/8" but can use 1/4" plug instead. Reference Flex 6000 Series User Manual (ver Version 1.4.11, pg. 30)
5. FT-2000D Operating Manual, Filename: FT-2000D_OM_ENG_EH025H142.pdf
6. FLEX 5000 Radio Manual, Version 2.0



CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	5/19/2017	Initial release
B	5/21/2017	Redesign and cable lengths
C	6/2/2017	Added Left/Right CH Mixer
D	6/20/2017	Added FT2000D References
E	6/23/2017	Added FLEX 5000 References
E1/F	8/16/2017	rev-E1: Parts List Update. rev-F: Added PTT Circuit.

8-pin Plug
Flex 6000
Series or FT2000D
Transceiver

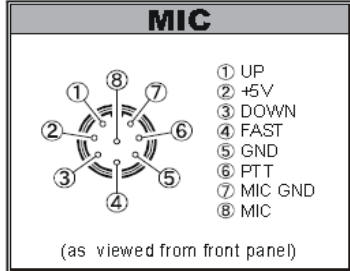


Rear View of Foster
Connector Plug
View of Plug's
Solder Terminals

FLEX 6000 SERIES
USER MANUAL INFO



FT2000D
USER MANUAL INFO

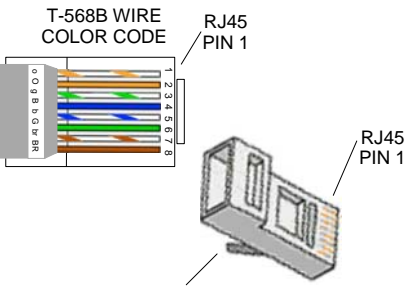


FLEX 5000 SERIES
USER MANUAL INFO

Table 2: Microphone Connector Pin-Out

Pin #	Signal	Diagram
1	Not Connected	
2	+5 VDC (max 65 mA)	
3	Not Connected	
4	Not Connected	
5	Chassis GND (Shield)	
6	PTT (+)	
7	Mic (-)	
8	Mic (+)	

RJ45 Plugs Into
CS520 Base Unit



ITEM	QTY	DESCRIPTION
5	1	1/8" Stereo Phone Extension Cable, Cut to Create Plug and Jack, HOSA P/N MHE-110
4	1	1/8" jack to 1/4" plug Stereo Adapter (See Note #4)
R1, R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
3	1	1/8" Stereo Phone Plug With Cable, Cut Plug End 36" & Excess Cable Used With Item #1.
2	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft)
1	1	Foster 8-pin plug connector (Univ. Radio Inc. #2112) With 36" of Cable (Item #3) Attached

ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE FLEX 6000/5000 SERIES OR FT2000D CABLE TO CS520 WITH DUAL AUDIO WATCH MIXER		
gh	A2	4000-0019
8/16/2017	SCALE	SHEET 1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/16/2017

Bill of Materials Drawing 4000-0019 rev-F

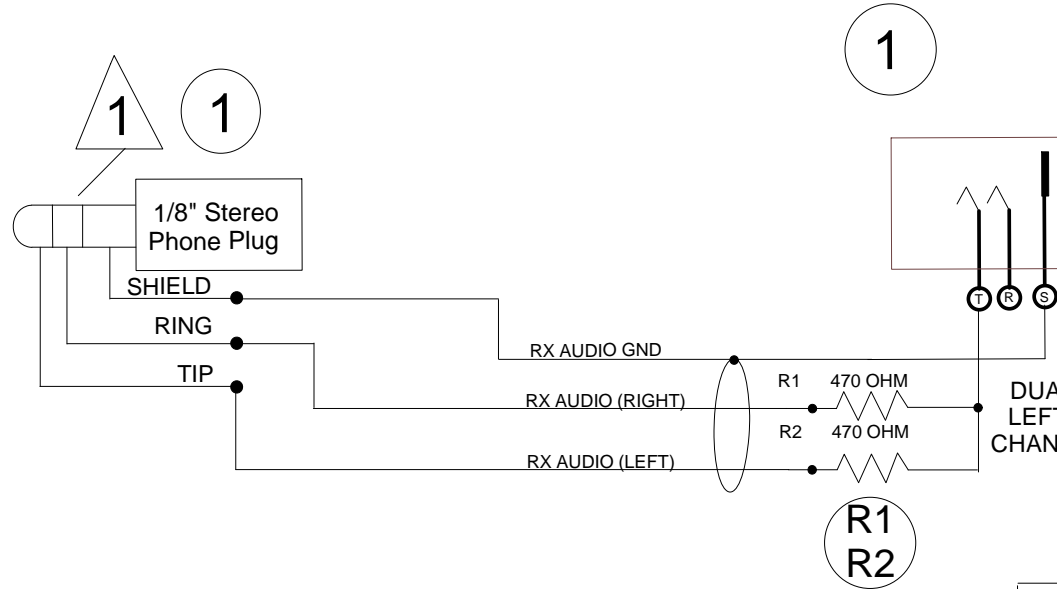
Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.universal-radio.com/)	2112	1
2	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
3	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
R1,R2	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	5-Pack, Gold Plated 6.3mm (1/4 inch) to 3.5 mm Male to Female Stereo Adapter	Cable Matters	501003X5	Amazon	501003X5	1
5	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1

NOTES

1. Cut Item #1 cable to length 9 inches from phone plug end.

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	6/5/2017	Initial release
A1	8/16/2017	Updated Parts List P/N's

Connects to Rx Headphone Output



Connects to CS520 Base Unit (Mono)

DUAL WATCH LEFT & RIGHT CHANNEL MIXER

R1, R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
1	1	1/8" Stereo Phone Extension Cable, Cut to Create Plug and Jack, HOSA P/N MHE-110
ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE DUAL WATCH AUDIO MIXER ADAPTER		
gh	A2	DWG NO 4000-0020
8/16/2017	SCALE	REV A1
		SHEET 1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

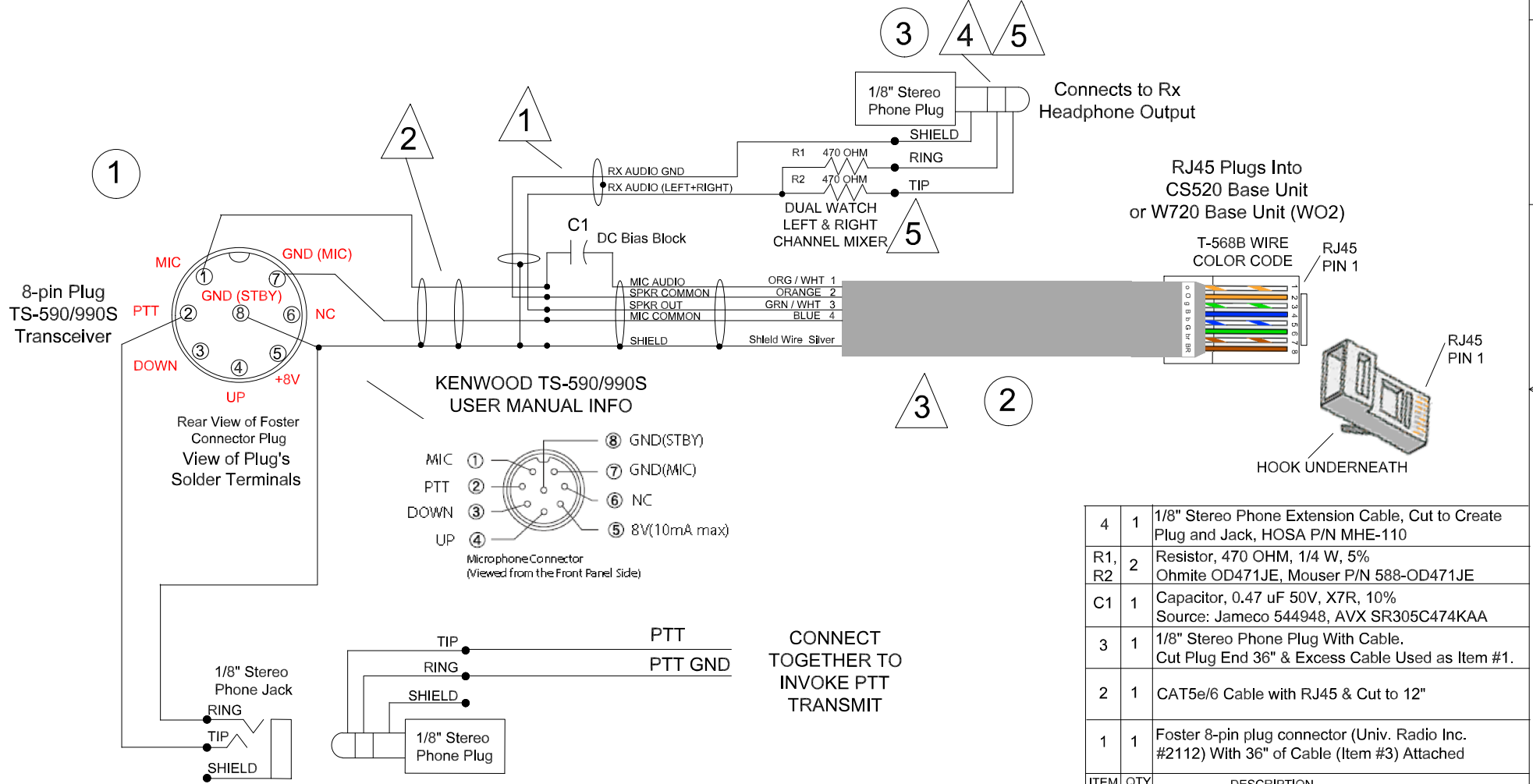
Date: 8/16/2017

Bill of Materials Drawing 4000-0020 rev-A1

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1
R1,R2	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2

- NOTES**
1. Cut Item #3 cable to length 36 inches from phone plug end.
 2. Use excess cable for connecting to Item #1 cable, 36 inches.
 3. Cut CAT5e/6 cable to approx. 12 inches from RJ45 end.
 4. Must be stereo (T-R-S) plug only! Alternate connector can be 1/4" phone plug.
 5. The TS-590S is not Dual Receive and R1/R2 can be replaced with jumper (mono only)

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	6/18/2017	Initial release
A1	8/4/2017	Updated Parts List P/N's
A2	7/3/2020	Added TS-590S to Drawing



4	1	1/8" Stereo Phone Extension Cable, Cut to Create Plug and Jack, HOSA P/N MHE-110
R1, R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
3	1	1/8" Stereo Phone Plug With Cable. Cut Plug End 36" & Excess Cable Used as Item #1.
2	1	CAT5e/6 Cable with RJ45 & Cut to 12"
1	1	Foster 8-pin plug connector (Univ. Radio Inc. #2112) With 36" of Cable (Item #3) Attached

CONNECT TOGETHER TO INVOKE PTT TRANSMIT

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE KENWOOD TS-590/990S TO CS520 CABLE WITH DUAL AUDIO WATCH MIXER		
gh	A2	DWG NO 4000-0021
7/3/2020	SCALE	SHEET 1 of 1

Date: 8/10/2017

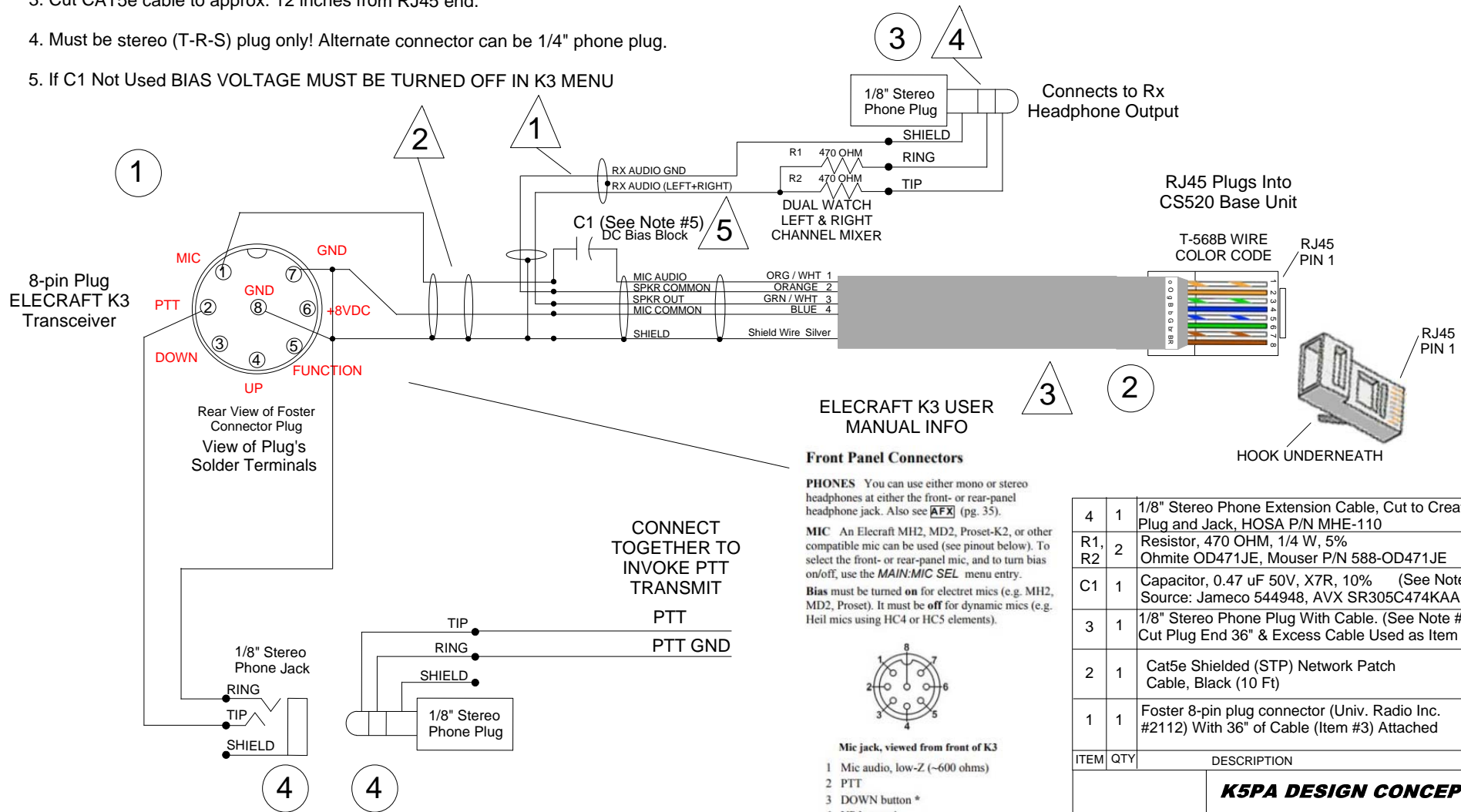
Bill of Materials Drawing 4000-0021 rev-A1

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.universal-radio.com/)	2112	1
2	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
3	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
R1,R2	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
4	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1

NOTES

1. Cut Item #3 cable to length 36 inches from phone plug end.
2. Use excess cable for connecting to Item #1 cable, 36 inches.
3. Cut CAT5e cable to approx. 12 inches from RJ45 end.
4. Must be stereo (T-R-S) plug only! Alternate connector can be 1/4" phone plug.
5. If C1 Not Used BIAS VOLTAGE MUST BE TURNED OFF IN K3 MENU

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	6/30/2017	Initial release
A1/A2	8/16/2017	Updated Parts List P/N's



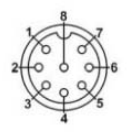
ELECRAFT K3 USER MANUAL INFO

Front Panel Connectors

PHONES You can use either mono or stereo headphones at either the front- or rear-panel headphone jack. Also see **AFX** (pg. 35).

MIC An Elecraft MH2, MD2, Proset-K2, or other compatible mic can be used (see pinout below). To select the front- or rear-panel mic, and to turn bias on/off, use the **MAIN:MIC SEL** menu entry.

Bias must be turned **on** for electret mics (e.g. MH2, MD2, Proset). It must be **off** for dynamic mics (e.g. Heil mics using HC4 or HC5 elements).



- Mic jack, viewed from front of K3**
- 1 Mic audio, low-Z (~600 ohms)
 - 2 PTT
 - 3 DOWN button *
 - 4 UP button *
 - 5 FUNCTION button *
 - 6 8V (10 mA max)
 - 7, 8 Ground

* See **CONFIG:MIC BTN** menu entry.

ITEM	QTY	DESCRIPTION
4	1	1/8" Stereo Phone Extension Cable, Cut to Create Plug and Jack, HOSA P/N MHE-110
R1, R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% (See Note #5) Source: Jameco 544948, AVX SR305C474KAA
3	1	1/8" Stereo Phone Plug With Cable. (See Note #4) Cut Plug End 36" & Excess Cable Used as Item #1.
2	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft)
1	1	Foster 8-pin plug connector (Univ. Radio Inc. #2112) With 36" of Cable (Item #3) Attached

K5PA DESIGN CONCEPTS

TITLE
ELECRAFT K3 TO CS520 CABLE WITH DUAL AUDIO WATCH MIXER

gh	A2	4000-0022	A2
8/16/2017	SCALE	SHEET	1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/16/2017

Bill of Materials Drawing 4000-0022 rev-A2

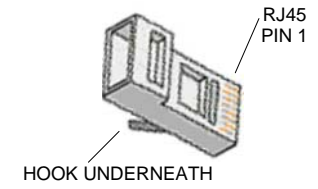
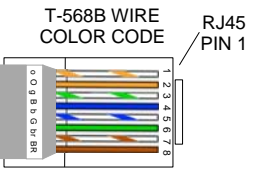
Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.univers al-radio.com/)	2112	1
2	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
3	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
R1,R2	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1

NOTES #

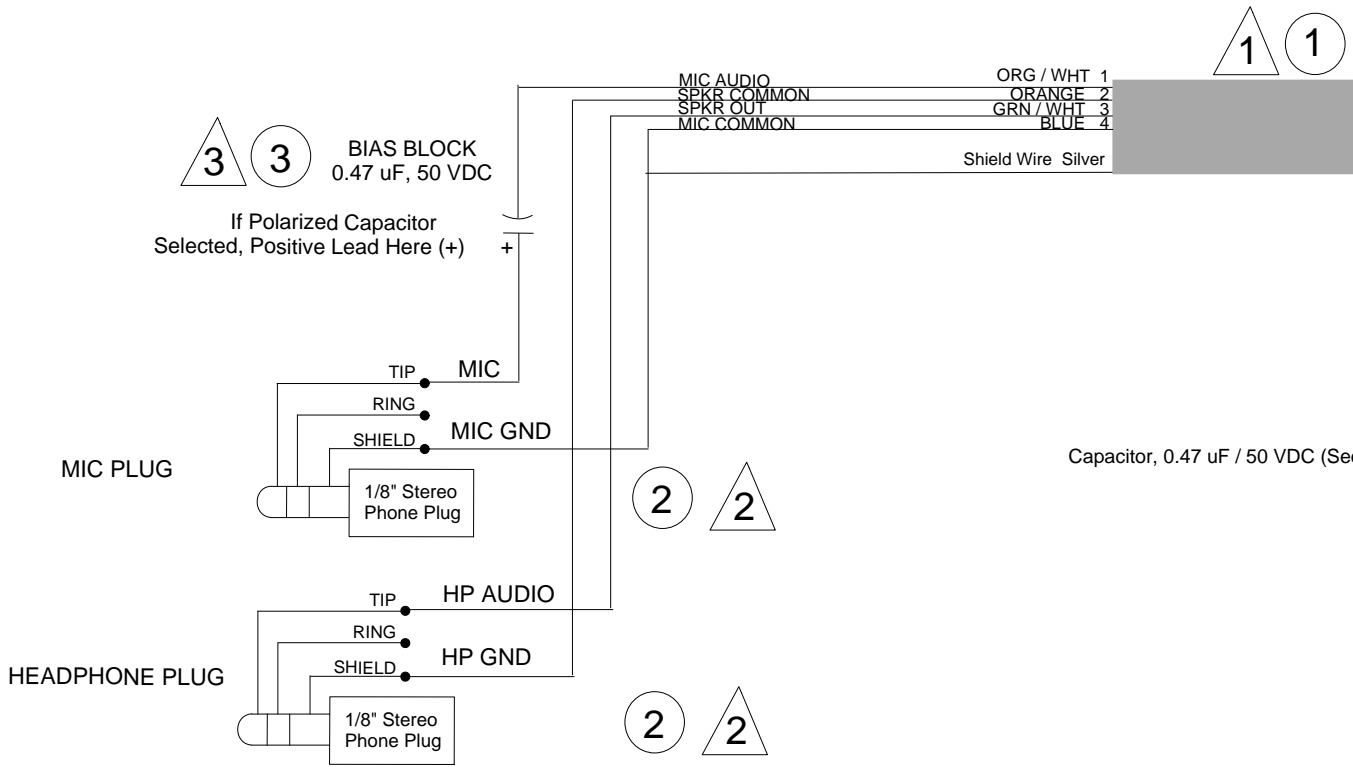
1. Cut CAT5e cable to approx. 12 inches from RJ45 end.
2. Cut Item #2 cable to length 36 inches from phone plug end.
3. If C1 Not Used BIAS VOLTAGE MUST BE TURNED OFF IN RADIO MENU

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/3/2017	Initial release
A1	7/4/2017	Reversed Capacitor Orientation
A2	7/10/2017	Updated Bill of Materials and Notes
A3	8/16/2017	Updated Bill of Materials

RJ45 PLUGS INTO CS520 BASE UNIT



Capacitor, 0.47 uF / 50 VDC (See Note #3)



ITEM	QTY	DESCRIPTION
3	1	Capacitor, 0.47 uF 50V, X7R, 10% (See Note #3) Source: Jameco 544948, AVX SR305C474KAA
2	2	1/8" Stereo Phone Plug With Cable Greater Than 36 Inches.
1	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft)

K5PA DESIGN CONCEPTS

TITLE
1/8" PHONE PLUGS TO CS520

SIZE A2	CAGE CODE	DWG NO 4000-0023	REV A3
SCALE	SHEET 1 of 1		

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

gh
8/16/2017

Date: 8/16/2017

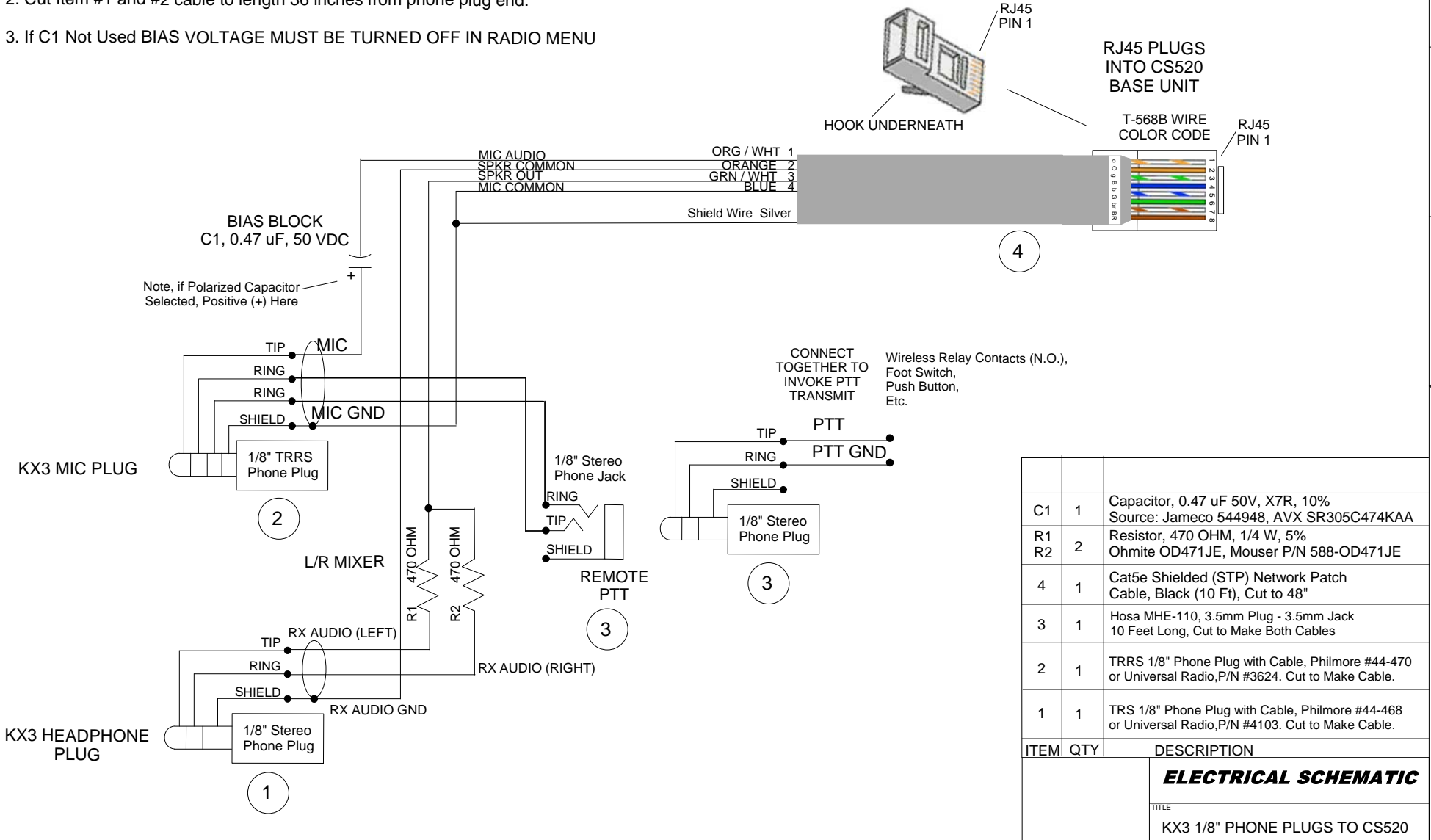
Bill of Materials Drawing 4000-0023 rev-A3

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
2	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
3	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	

NOTES 

1. Cut CAT5e cable to approx. 48 inches from RJ45 end.
2. Cut Item #1 and #2 cable to length 36 inches from phone plug end.
3. If C1 Not Used BIAS VOLTAGE MUST BE TURNED OFF IN RADIO MENU

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/4/2017	Initial release
A1-A2	8/16/2017	Updated Bill of Materials



ITEM	QTY	DESCRIPTION
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
R1 R2	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
4	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft), Cut to 48"
3	1	Hosa MHE-110, 3.5mm Plug - 3.5mm Jack 10 Feet Long, Cut to Make Both Cables
2	1	TRRS 1/8" Phone Plug with Cable, Philmore #44-470 or Universal Radio, P/N #3624. Cut to Make Cable.
1	1	TRS 1/8" Phone Plug with Cable, Philmore #44-468 or Universal Radio, P/N #4103. Cut to Make Cable.

ELECTRICAL SCHEMATIC			
TITLE			
KX3 1/8" PHONE PLUGS TO CS520			
SIZE	CAGE CODE	DWG NO	REV
A2		4000-0024	A2
SCALE	SHEET		1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

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8 7 6 5 4 3 2 1

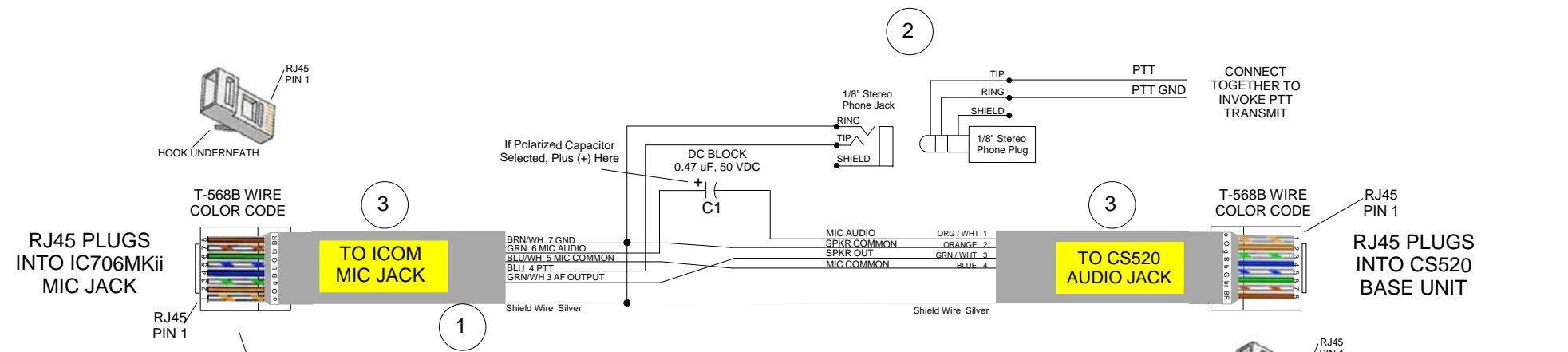
8 7 6 5 4 3 2 1

Date: 8/16/2017

Bill of Materials Drawing 4000-0024 rev-A2

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Mini to mini 3 cond cbl, 6 ft. (cut and discard one end)	Philmore	44-468	Univ. Radio Inc. (http://www.universa l-radio.com/)	4103	1
2	Mini to mini 4 cond cbl, 3 ft. (cut and discard one end)	Philmore	44-470	Univ. Radio Inc. (http://www.universa l-radio.com/)	3624	1
3	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1
4	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
R1,R2	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	

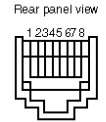
CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/9/2017	Initial release
A1	8/16/2017	Updated Bill of Materials



RJ45 Connections by Wire Color/Pin #			
Radio Plug	RJ45 Pin/Function	CS520	RJ45 Pin/Function
BRN/WH	Pin 7, GND	ORG	Pin 2, SPKR COM
GRN Note-1	Pin 6, MIC AUDIO	ORG/WH	Pin 1, MIC AUDIO
BLU/WH	Pin 5, MIC COM	BLU	Pin 4, MIC COM
BLU	Pin 4, PTT	Connects to Jack for PTT Function	
GRN/WH	Pin 3, AF OUTPUT	GRN/WH	Pin 3, AF OUTPUT
Silver	Shield Wire	Silver	Shield Wire

Note 1 - This connects through 0.47 uF Capacitor

- ① +8 V DC output
- ② Frequency / up/down
- ③ AF output
- ④ PTT
- ⑤ GND (microphone ground)
- ⑥ Microphone input
- ⑦ GND
- ⑧ Squelch switch



MICROPHONE JACK CONNECTOR
PANEL VIEW
FROM ICOM 706 USER MANUAL

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

3	2	Cable Labels, Connections Clearly Marked
2	1	1/8" Stereo Phone Plug & Jack. Cut Jack End 36" & Also Use Excess Cable for Relay End.
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
1	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft), Cut to Length Needed.
ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE ICOM 706MKii CABLE TO CS520		
gh	A2	DWG NO 4000-0026
8/16/2017	SCALE	REV A1
		SHEET 1 of 1

Date: 8/16/2017

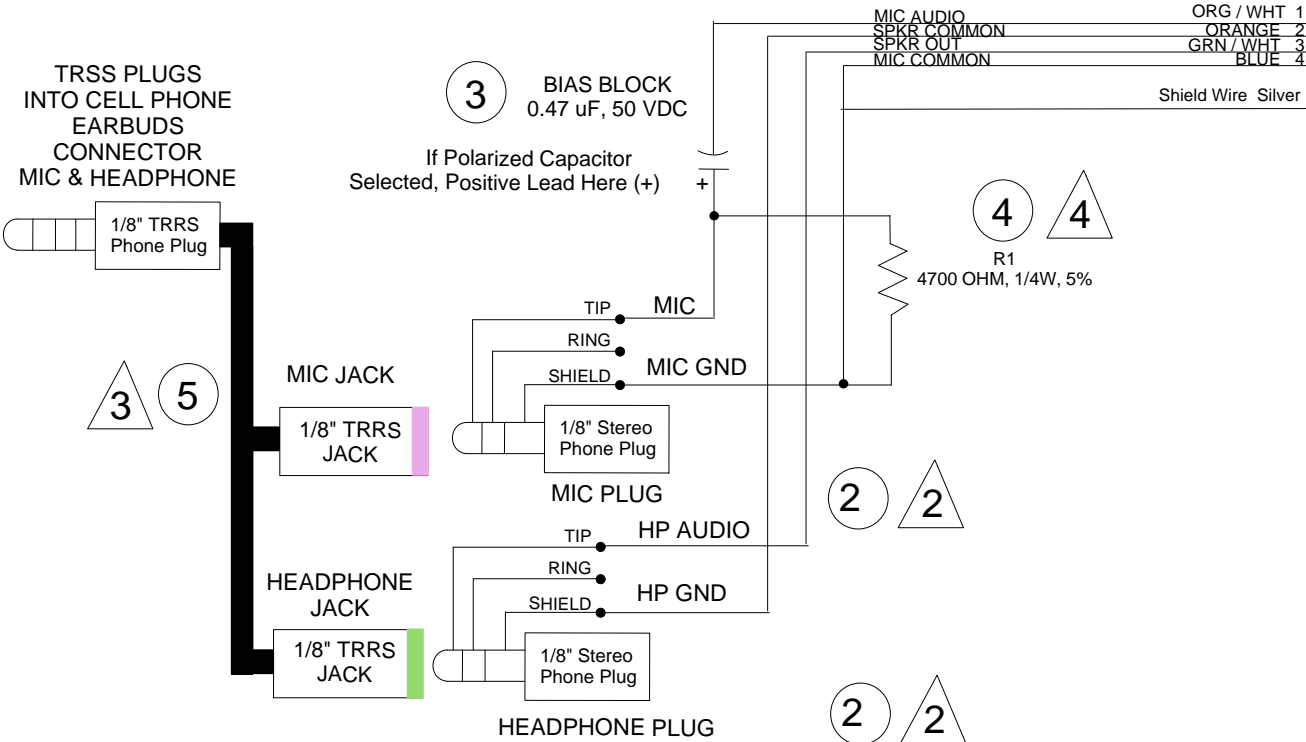
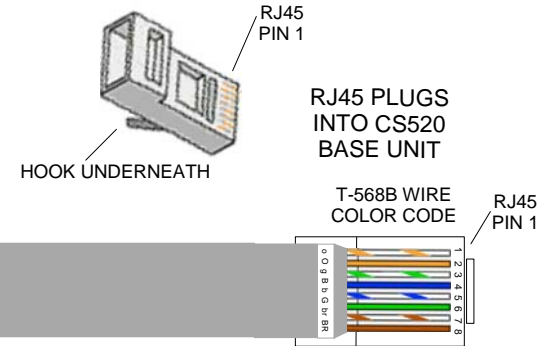
Bill of Materials Drawing 4000-0026 rev-A1

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
2	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1
3	Builder's Choice					1

NOTES #

1. Cut CAT5e cable to approx. 12 inches from RJ45 end.
2. Cut Item #2 cable to length 36 inches from phone plug end.
3. Item #5 Is NOT a Y-Cable but joins the TRS MIC and TRS Headphone Jacks to a TRRS Plug.
4. Resistor (R1) Needed for Cell Phone to Detect External Mic is Connected.
5. Cable Tests Made With with iPhone 7 and Samsung Tablet.

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/11/2017	Initial release
A1	7/12/2017	Add ref. 4000-0028 schematic, Item #5.
A2	8/16/2017	Parts Listed Updated



5	1	StarTech.com Headset adapter for headsets with separate headphone / microphone plugs - 3.5mm 4 position to 2x 3 position 3.5mm M/F Search Amazon.com The wiring for the Headset/Mic Adapter is shown in Drawing 4000-0028.
4	1	Resistor, 4700 OHM, 1/4 W, 5% (See Note #3) Ohmite OD472JE, Mouser P/N 588-OD472JE
3	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
2	2	1/8" Stereo Phone Plug With Cable Greater Than 36 Inches.
1	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft), Cut to 12"
ITEM	QTY	DESCRIPTION

K5PA DESIGN CONCEPTS

TITLE
Cell Phone to CS520 Adapter

SIZE A2 CAGE CODE DWG NO 4000-0027 REV A2
SCALE SHEET 1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/16/2017

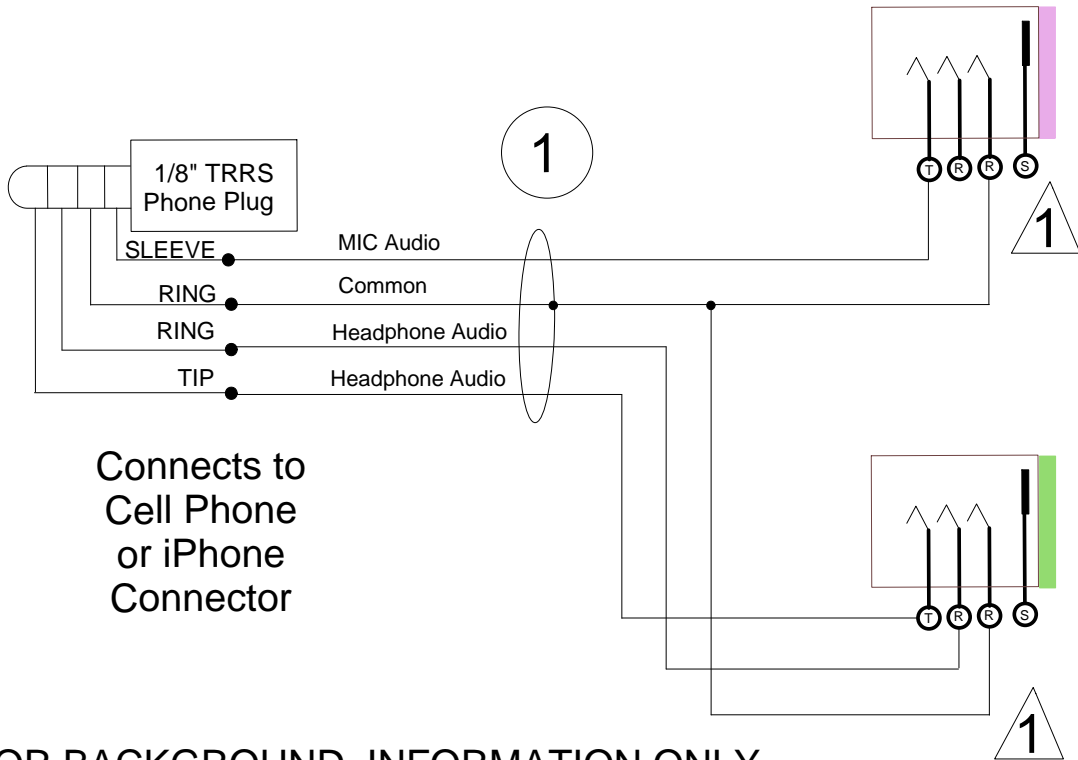
Bill of Materials Drawing 4000-0027 rev-A2

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
2	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
3	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	Resistor, 4700 Ohms, 1/4W, 5%	Ohmite	OD472JE	Mouser	588-OD472JE	1
	ALTERNATE SOURCE: Resistor, 4700 Ohms, 1/4W, 5%	Jameco Valuepro	CF1/4W102JRC	Jameco	691024	
5	StarTech.com Headset adapter for headsets with separate headphone / microphone plugs - 3.5mm 4 position to 2x 3 position 3.5mm M/F	StarTech	MUYHSMFF	Amazon	MUYHSMFF	1
6	IF NEEDED FOR CELL PHONE CASE HEADPHONE JACK CLEARANCE Audio Splitter Cable 3.5mm Male to 2 Female Jack Headphone Splitter Adapter 4-Pole Aux Cable	ARCHEER	LYSB01M315XJT-ELECTRNCS	Amazon	581-SR305C474KAA	1

NOTES

1. When a TRS plug connects into these jacks, a short is created by the Plug's Sleeve across the Jack's Ring and Sleeve of each jack. Without a plug inserted, the Jack's Sleeve is disconnected from the common line.
2. A continuity test on this adapter cable was made to create this diagram.

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/17/2017	Initial release
A1	8/16/2017	Materials Updated



Microphone Jack (Sometimes Pink Colored)

Headphone Jack (Sometimes Green Colored)

Connects to Cell Phone or iPhone Connector

FOR BACKGROUND INFORMATION ONLY
 This is the wiring for how an adapter cable is wired for headsets with separate headphone / microphone plugs - 3.5mm 4 position to 2x 3 position 3.5mm M/F.
 Manufacturer: StarTech.com Headset adapter
 Search: Amazon.com

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

1	1	Complete Cable Assembly Purchased as One Adapter.
ITEM QTY		DESCRIPTION
		StarTech.com Headset adapter for headsets with separate headphone / microphone plugs - 3.5mm 4 position to 2x 3 position 3.5mm M/F Search Amazon.com
		K5PA DESIGN CONCEPTS
		TITLE TRS Mic / TRS Headphones to TRRS Plug Adapter Wiring
gh	A2	DWG NO 4000-0028
8/16/2017	SCALE	REV A1
		SHEET 1 of 1

Date: 8/16/2017

Bill of Materials Drawing 4000-0028 rev-A1

Item	Part Description	Mfrgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Headset adapter for headsets with separate headphone / microphone plugs - 3.5mm 4 position to 2x 3 position 3.5mm M/F	StarTech	MUYHSMFF	Amazon	MUYHSMFF	1

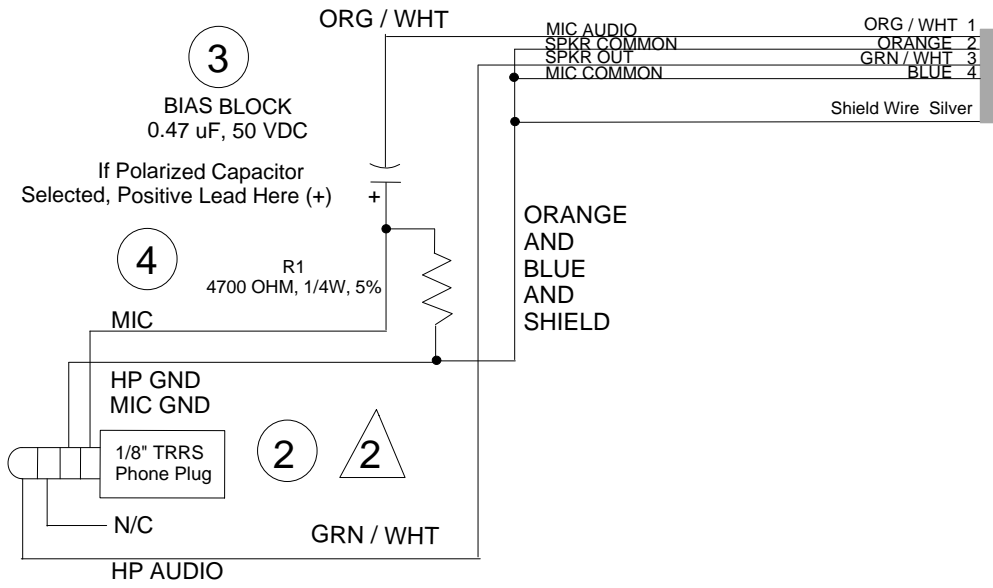
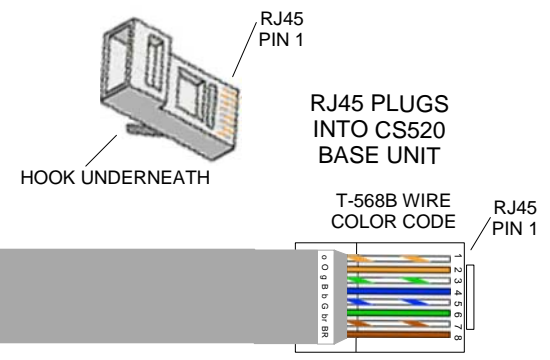
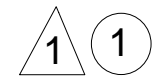
8 7 6 5 4 3 2 1

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/14/2017	Initial release
A1	8/16/2017	Parts List Update

NOTES



1. Cut CAT5e cable to approx. 12 inches from RJ45 end.
2. Verify Cell Phone Plug Inserts and Fits Into Cell Phone.
Some Connectors Will Be Too Large For Cell Phone Case Being Used.



ITEM	QTY	DESCRIPTION
4	1	Resistor, 4700 OHM, 1/4 W, 5% Ohmite OD472JE, Mouser P/N 588-OD472JE
3	1	Capacitor, 0.47 uF / 50 VDC 0.47 uF 50V, X7R, 10% Jameco #544948 / JVP # SR305C474KAA
2	2	TRRS Plug, 1/8" for iPhone or Cell Phone
1	1	CAT5e Shielded Cable with RJ45 & Cut to 12"

K5PA DESIGN CONCEPTS

TITLE
CS520 to Cell Phone Cable

SIZE A2	CAGE CODE	DWG NO 4000-0029	REV A1
SCALE	SHEET 1 of 1		

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

8 7 6 5 4 3 2 1

Date: 8/16/2017

Bill of Materials Drawing 4000-0029 rev-A1

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
2	Mini to mini 4 cond cbl, 3 ft. (cut and discard one end)	Philmore	44-470	Univ. Radio Inc. (http://www.universal-radio.com/)	3624	1
3	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	Resistor, 4700 Ohms, 1/4W, 5%	Ohmite	OD472JE	Mouser	588-OD472JE	1
	ALTERNATE SOURCE: Resistor, 4700 Ohms, 1/4W, 5%	Jameco Valuepro	CF1/4W102JRC	Jameco	691024	
5	IF NEEDED FOR CELL PHONE CASE HEADPHONE JACK CLEARANCE Audio Splitter Cable 3.5mm Male to 2 Female Jack Headphone Splitter Adapter 4-Pole Aux Cable	ARCHEER	LYSB01M315XJT-ELECTRNCS	Amazon	LYSB01M315XJT-ELECTRNCS	1

NOTES #

1. Cut Item #2 cable to length 60 inches from phone plug end. Use both halves for plug cables.
2. Pin 1 wire printed circuit trace must be cut so capacitor can be soldered in series with Pin 1. Cut through the trace on upper AND lower side of PCBA!
3. Add 2 jumpers wires to connect grounds together on circuit board, Pins 2-4-S (Shield)

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/18/2017	Initial release

F

F

E

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D

D

C

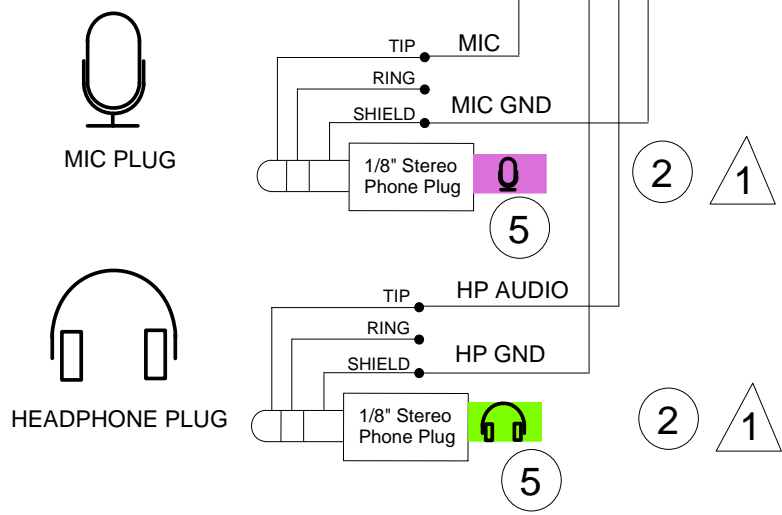
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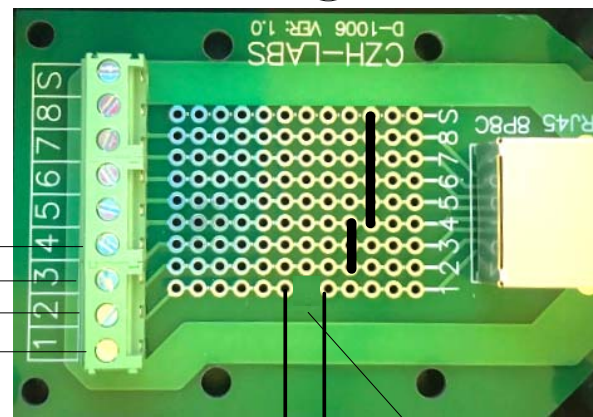
B

A

A



MIC COMMON / Wire to Pin 4 on Terminal Post
 SPKR OUT / Wire to Pin 3 on Terminal Post
 SPKR COMMON / Wire to Pin 2 on Terminal Post
 MIC AUDIO / Wire to Pin 1 Terminal Post



RJ45 Socket.
 Use RJ45 Male to
 RJ45 Male Cable
 to plug into CS520
 Base Unit

If Polarized Capacitor
 Selected, Positive Lead Here (+)
 BIAS BLOCK
 0.47 uF, 50 VDC

5	1	Heat Shrink Tubing, 1/4" D x 3/4" L. Gardner Bender HST-ASTA Thin Wall 2:1 Shrink Ratio. Green and Pink Color.
4	1	Case, ABS, Economical Type 3.3x2.2x0.9" Black Hammond 1591XXMSBK Mouser 546-1591XXMSBK
3	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
2	2	1/8" Stereo Phone Plug - Plug, 10 Feet, Cut in Half. Source: Hosa, P/N CMM-110, Amazon
1	1	RJ45 Shielded Breakout Board. Electronics Salon P/N MD-D1006R-1, Amazon.
ITEM	QTY	DESCRIPTION

K5PA DESIGN CONCEPTS

TITLE
 CS520 to Two 1/8" Plugs for Sound Card

gh	A2	4000-0030	REV A
7/18/2017	SCALE	SHEET 1 of 1	

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/16/2017

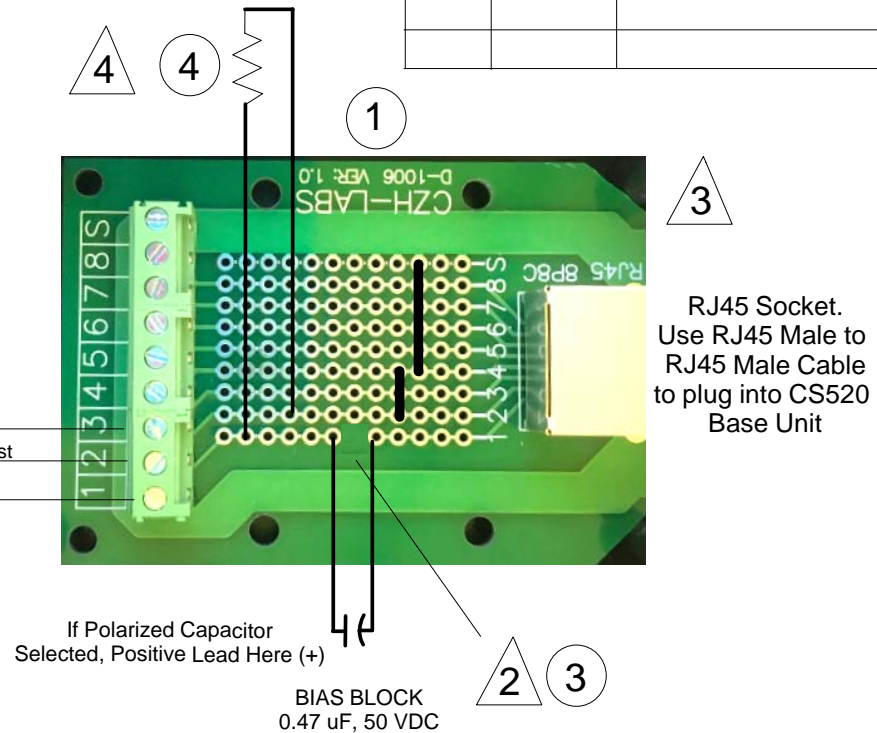
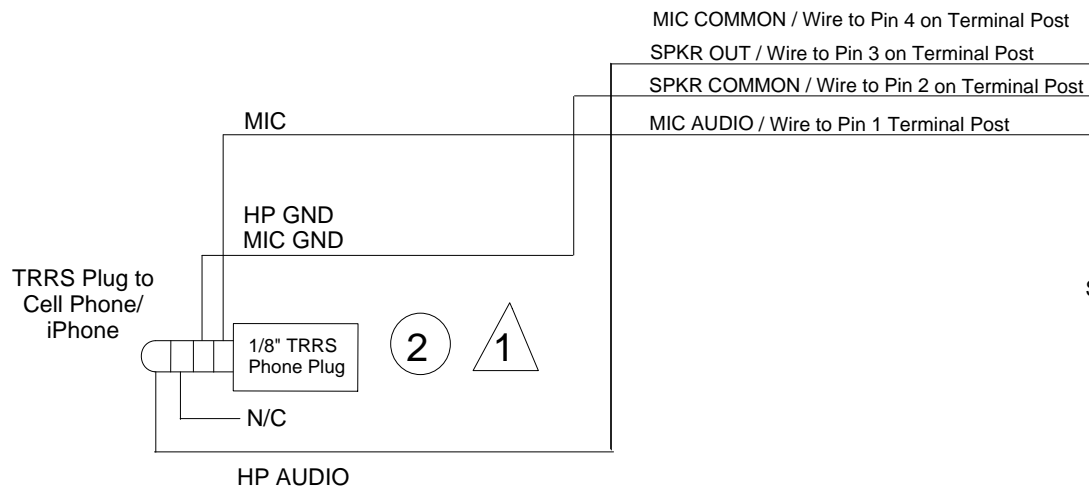
Bill of Materials Drawing 4000-0030 rev-A

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	RJ45 8P8C Right Angle Shielded Jack Breakout Board, Terminal Block Connector.	Electronics-Salon	MD-D1006R-1	Amazon	MD-D1006R-1	1
2	Hosa CMM-110 3.5 mm TRS to 3.5 mm TRS Stereo Interconnect Cable, 10 feet	HOSA	CMM-110	Amazon	CMM-110	1
3	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	Case, ABS, Economical Type 3.3x2.2x0.9" Black	Hammond	1591XXMSBK	Mouser	546-1591XXMSBK	1
5	Heat Shrink Tubing, 1/4" D x 3/4" L. 2:1 Shrink Ratio. Green and Pink Color.	Gardner Bender	HST-ASTA Thin Wall	Amazon	HST-ASTA	1
6	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters)	C2G/Cables to Go	28690	Amazon	28690	1
	ALTERNATE SOURCE: Cable Matters 5 Pack, Cat6a Snagless Shielded (SSTP/SFTP) Ethernet Patch Cable in Black 3 Feet	Cable Matters	160012-BLK-3x5	Amazon	160012-BLK-3x5	1

NOTES #

- Item 2 can be from a TRRS plug on cable cut to length
- Pin 1 wire printed circuit trace must be cut so capacitor can be soldered in series with Pin 1. Cut through the trace on upper AND lower side of PCBA!
- Add 2 jumpers wires to connect grounds together on circuit board, Pins 2-4-S (Shield)
- Resistor connects to Pin 1 (TRRS Plug Side) and Pin 2 (GND)

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	7/18/2017	Initial release



RJ45 Socket.
Use RJ45 Male to RJ45 Male Cable to plug into CS520 Base Unit

BIAS BLOCK
0.47 uF, 50 VDC

5	1	Case, ABS, Economical Type 3.3x2.2x0.9" Black Hammond 1591XXMSBK Mouser 546-1591XXMSBK
4	1	Resistor, 4700 OHM, 1/4 W, 5% Ohmite OD472JE, Mouser P/N 588-OD472JE
3	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
2	2	1/8" TRRS (3 Conductor and Ground) Phone Plug
1	1	RJ45 Shielded Breakout Board. Electronics Salon P/N MD-D1006R-1, Amazon.
ITEM	QTY	DESCRIPTION

K5PA DESIGN CONCEPTS

TITLE
CS520 to Cell Phone TRRS Plug

SIZE A2 CAGE CODE DWG NO 4000-0031 REV A
SCALE SHEET 1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/16/2017

Bill of Materials Drawing 4000-0031 rev-A

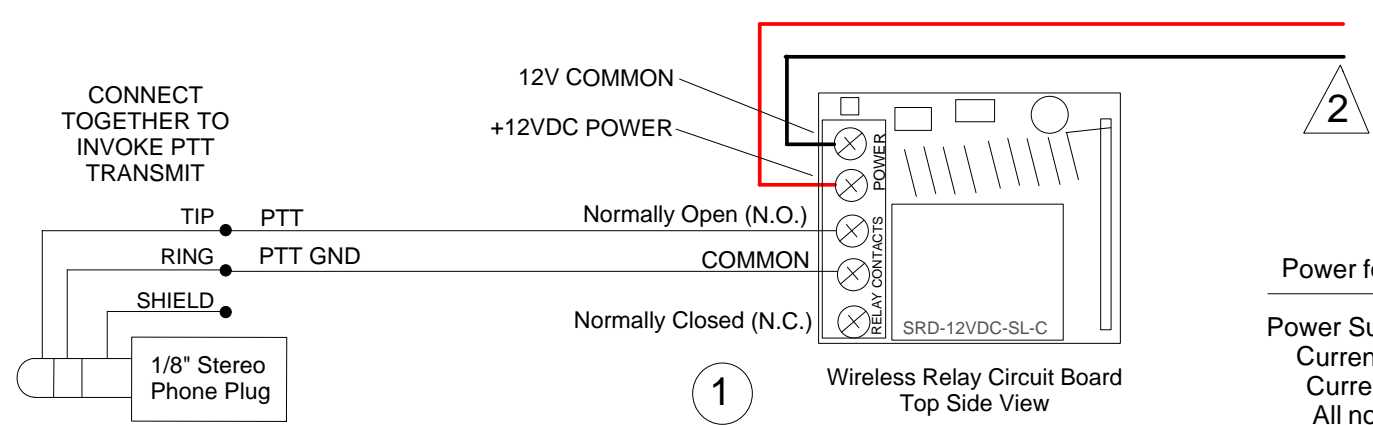
Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	RJ45 8P8C Right Angle Shielded Jack Breakout Board, Terminal Block Connector.	Electronics-Salon	MD-D1006R-1	Amazon	MD-D1006R-1	1
2	Mini to mini 4 cond cbl, 3 ft. (cut and discard one end)	Philmore	44-470	Univ. Radio Inc. (http://www.universal-radio.com/)	3624	1
3	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
4	Resistor, 4700 Ohms, 1/4W, 5%	Ohmite	OD472JE	Mouser	588-OD472JE	1
	ALTERNATE SOURCE: Resistor, 4700 Ohms, 1/4W, 5%	Jameco Valuepro	CF1/4W102JRC	Jameco	691024	
5	Case, ABS, Economical Type 3.3x2.2x0.9" Black	Hammond	1591XXMSBK	Mouser	546-1591XXMSBK	1
6	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters)	C2G/Cables to Go	28690	Amazon	28690	1
	ALTERNATE SOURCE: Cable Matters 5 Pack, Cat6a Snagless Shielded (SSTP/SFTP) Ethernet Patch Cable in Black 3 Feet	Cable Matters	160012-BLK-3x5	Amazon	160012-BLK-3x5	1
7	IF NEEDED FOR CELL PHONE CASE HEADPHONE JACK CLEARANCE Audio Splitter Cable 3.5mm Male to 2 Female Jack Headphone Splitter Adapter 4-Pole Aux Cable	ARCHEER	LYSB01M315XJT-ELECTRNCS	Amazon	581-SR305C474KAA	1

NOTES

1. Cut Item #2 to length needed for TRS plug and cable. Remaining portion with jack is usable with the CS520 cable build for the PTT jack.
2. Cut item #3 to length needed, Power Pole connectors or pigtails, or other connector may be attached per station requirements.

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	8/20/2017	Initial release

Connect to Station Power Supply
Nominal 12 VDC at 35 mA
(13.8 VDC can also be used)



+12VDC POWER
12V COMMON

Power for Wireless Relay Board

Power Supply Voltage = 13.8 VDC
Current, Relay OFF = 2.5 mA
Current, Relay ON = 35 mA
All nominal measurements



ITEM	QTY	DESCRIPTION
3	1	Zip Cord 3 ft of #22 AWG, Red/Black, vendor Quicksilver (www.qsradio.com), P/N rb22-50
2	1	1/8" Stereo Phone Extension Cable, Cut to Create Plug and Jack, HOSA P/N MHE-110
1	1	Wireless Relay Module, Quicksilver (www.qsradio.com) vendor, P/N wr-sin

K5PA DESIGN CONCEPTS

TITLE
Wireless Relay PTT Wiring

gh	A2	4000-0034	REV A
8/20/2017	SCALE	SHEET	1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 8/20/2017

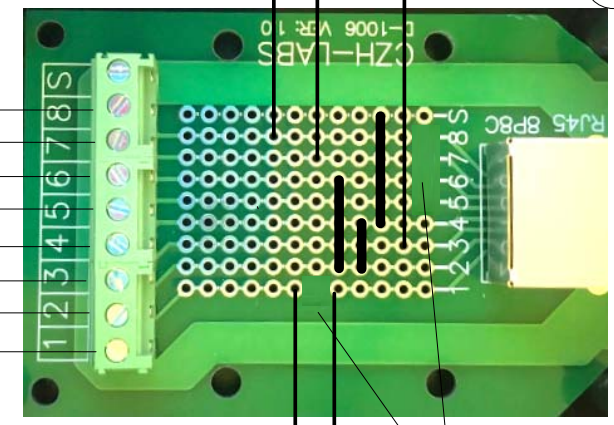
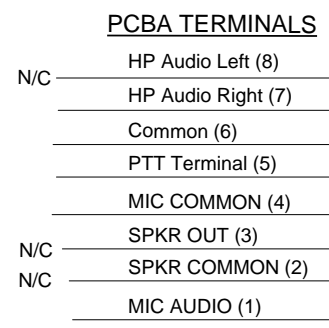
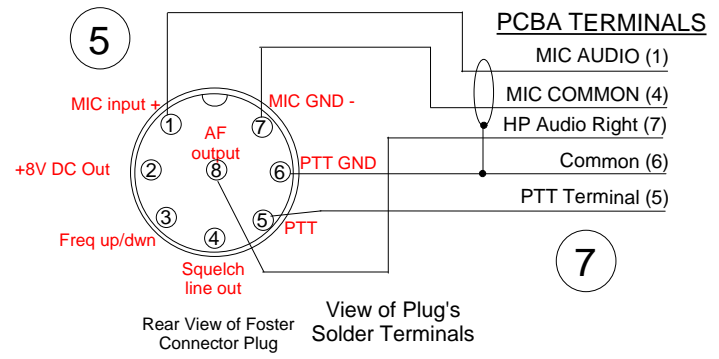
Bill of Materials Drawing 4000-0034 rev-A Wireless Relay PTT Wiring

Item	Part Description	Mfgr	Part No.	Vendor	Quick Link URLs and Instructions	Qty
1	Wireless Relay Module	Quicksilver	wr-sin	Quicksilver: Click This First -->	Quicksilver	1
					Then on their webpage select: Meters, USB, & Test Equipment and then Wireless Relay Single	
2	Red/Black Zip Cord 50 ft of #22. Use only 3 feet from roll of 50 feet for EACH relay wired.	Quicksilver	rb22-50	Quicksilver: Click This First -->	Quicksilver	3 Ft.
					Then on their webpage select: DC Power Cables & Connectors and then Red/Black Zip Cord 50 ft of #22	
3	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1

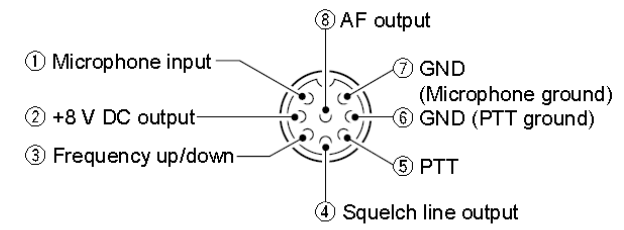
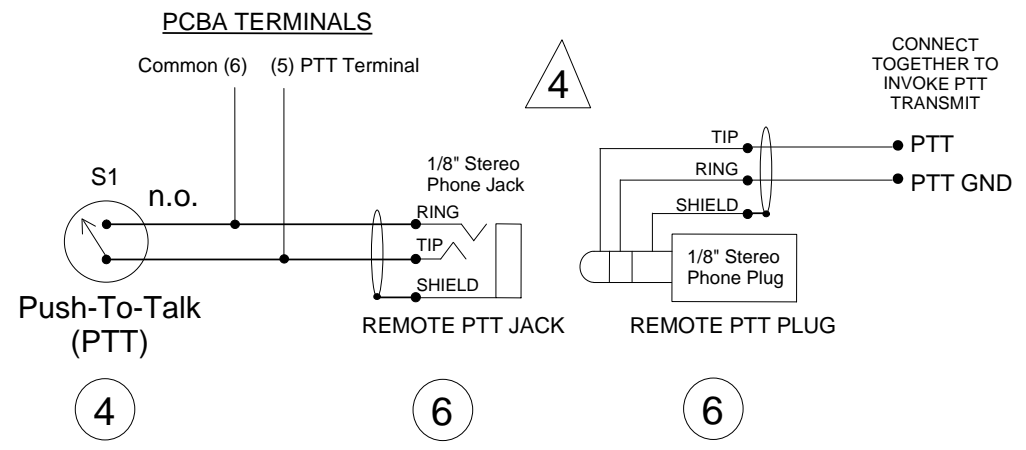
CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
--	1/10/2018	Initial release

NOTES #

- Pin 1, 5, 6, 7 and 8 printed wire circuit traces must be cut to isolate those traces from RJ45 pins. Cut through these traces on upper AND lower side of PCBA!
- Add 3 jumpers wires to connect grounds together on circuit board, Pins 2-4-6-S (Shield).
- Resistor 470 ohm connects Pin 8 to Pin 3. Other Resistor 470 ohm connects Pin 7 to Pin 3. The 2 resistors allow for a dual watch receiver audio summing circuit for future expansion.
- Cut Item #6 to create 1/8" jack and plug sections for PTT relay.



RJ45 Socket. Use RJ45 Male to RJ45 Male Cable to plug into CS520 or W720 Base Unit



Front panel view

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

#	1	These Refer to Item Numbers Found Listed in the Attached Bill of Materials (BoM)
ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE CS520 / W720 to IC7300 Cable Adapter		
gh	A2	4000-0045
1/10/2018	SCALE	SHEET 1 of 1

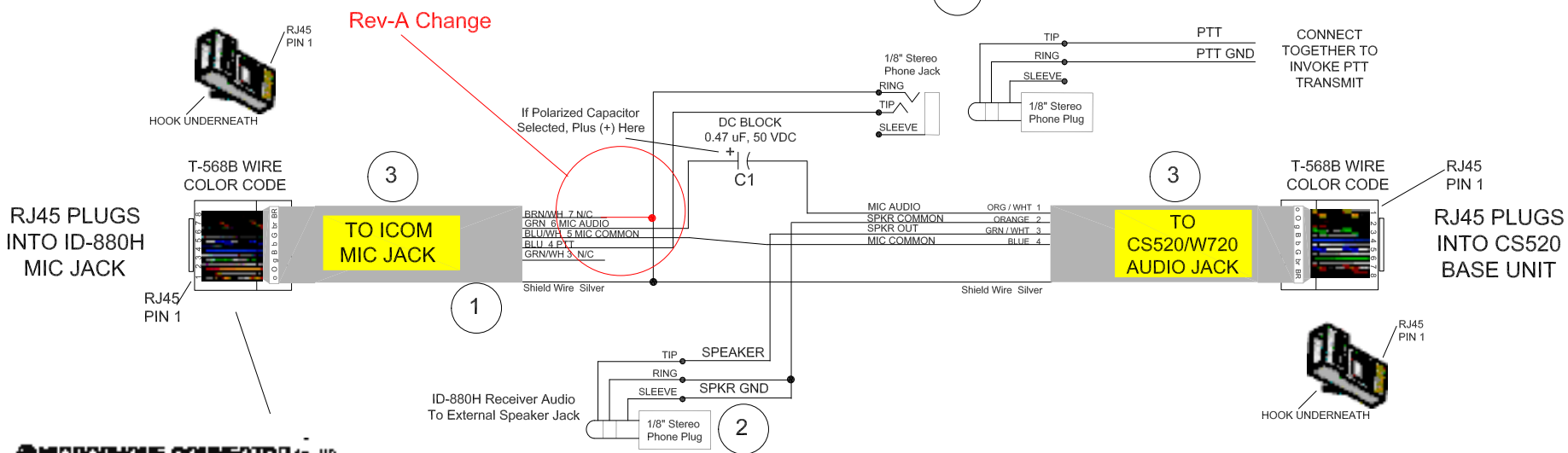
Date: 1/12/2018

Bill of Materials Drawing 4000-0045 Rev --

CS520 or W720 to IC7300

Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0045	RJ45 8P8C Right Angle Shielded Jack Breakout Board, Terminal Block Connector.	Electronics-Salon	MD-D1006R-1	Amazon	MD-D1006R-1	1
2	4000-0045	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
3	4000-0045	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
4	4000-0045	Momentary SPDT ON-(ON) Miniature Toggle Switch	NKK Switches	M2015SS1W01	2258777	2258777	1
5	4000-0045	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.universal-radio.com/)	2112	1
6	4000-0045	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1
7	4000-0045	Heil Sound HW-10 - Heil Sound Heil Wire Microphone Cable, Cut to 24 Inches	Heil	HLS-HW-10	DXE HLS-HW-10	HLS-HW-10	2
8	4000-0045	Case, ABS, Economical Type 3.3x2.2x0.9" Black	Hammond	1591XXMSBK	Mouser	546-1591XXMSBK	1
9	4000-0045	Cable Matters 5 Pack, Cat6a Snagless Shielded (SSTP/SFTP) Ethernet Patch Cable in Black 3 Feet	Cable Matters	160012-BLK-3x5	Amazon	160012-BLK-3x5	1

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
--	1/30/2018	Initial release
A	3/8/2018	Added ground connection on pin-7



MICROPHONE CONNECTOR (p. III)
Connects the supplied or an optional microphone.

① +8 V DC output (max. 10 mA)	⑤ GND (microphone ground)
② Channel up/down	⑥ MIC (microphone input)
③ 8 V control IN	⑦ GND
④ PTT	⑧ Data IN

MICROPHONE JACK CONNECTOR PANEL VIEW
FROM ICOM ID-880H USER MANUAL

This Can Also Be a MONO Plug. If STEREO (TRS) Must Connect Ring and Sleeve Together as Shown.

RJ45 Connections by Wire Color/Pin #			
Radio Plug	RJ45 Pin/Function	CS520	RJ45 Pin/Function
BRN/WH	Pin 7, N/C	ORG	Pin 2, SPKR COM
GRN Note-1	Pin 6, MIC AUDIO	ORG/WH	Pin 1, MIC AUDIO
BLU/WH	Pin 5, MIC COM	BLU	Pin 4, MIC COM
BLU	Pin 4, PTT	Connects to Jack for PTT Function	
GRN/WH	Pin 3, N/C	GRN/WH	Pin 3, ID-880H SPKR
Silver	Shield Wire	Silver	Shield Wire

Note 1 -This connects through 0.47 uF Capacitor

ITEM	QTY	DESCRIPTION
3	2	Cable Labels, Connections Clearly Marked
2	2	1/8" Stereo Phone Plug & Jack. Cut Jack End 36" & Also Use Excess Cable for Relay End.
C1	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA
1	1	Cat5e Shielded (STP) Network Patch Cable, Black (10 Ft), Cut to Length Needed.

ITEM		QTY		DESCRIPTION	
K5PA DESIGN CONCEPTS					
TITLE ICOM ID-880H CABLE TO CS520 / W720					
SIZE	A2	CAGE CODE	DWG NO	REV	A
SCALE			4000-0046		
DATE	1/30/2018			SHEET	1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 1/30/2018

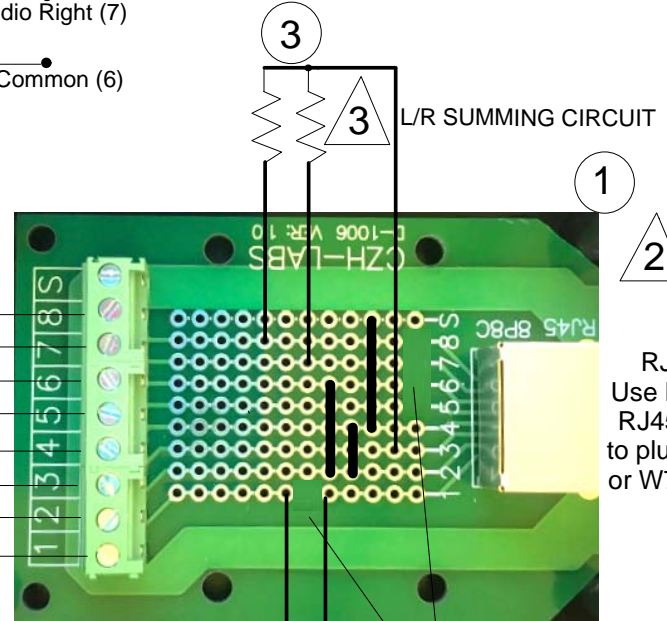
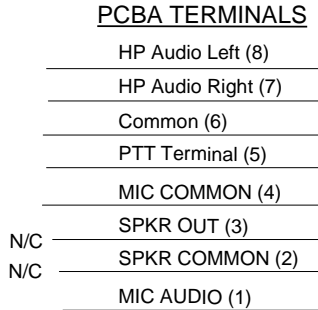
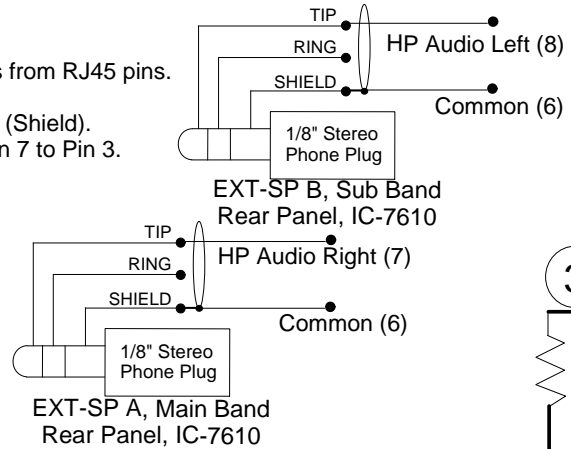
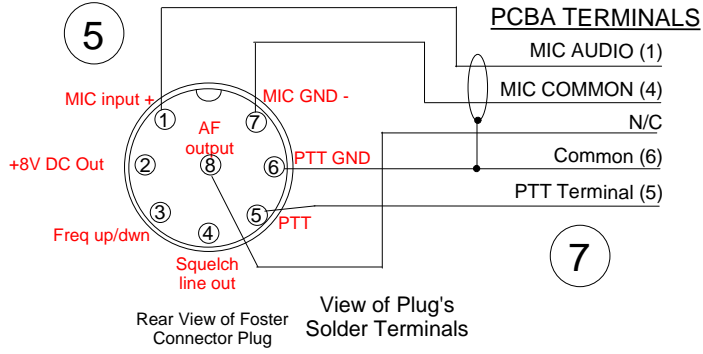
Bill of Materials Drawing 4000-0046 rev--

Item	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	Cat5e Molded Shielded (STP) Network Patch Cable, Black (10 Feet/3.04 Meters)	C2G/Cables to Go	28693	Amazon	28693	1
C1	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
	ALTERNATE SOURCE: 0.47 uF 50V, X7R, 10%	JVP	SR305C474KAA	Jameco	544948	
2	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	2
3	Builder's Choice					1

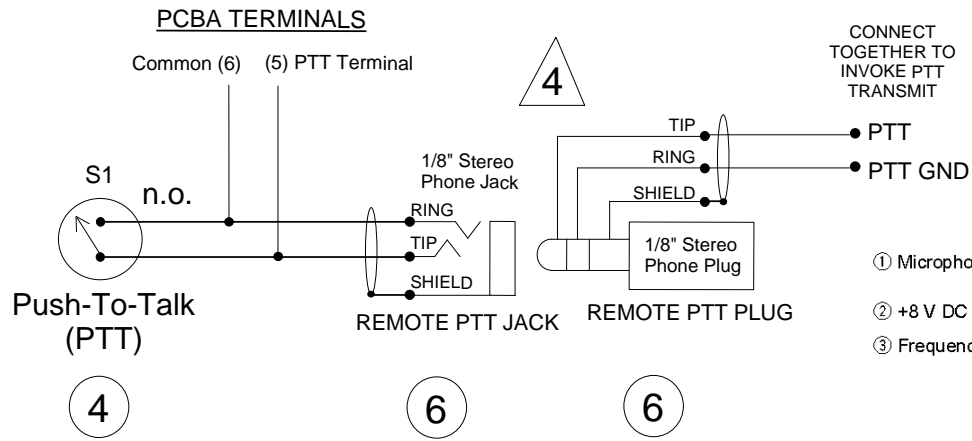
NOTES #

- Pin 1, 5, 6, 7 and 8 printed wire circuit traces must be cut to isolate those traces from RJ45 pins. Cut through these traces on upper AND lower side of PCBA!
- Add 3 jumpers wires to connect grounds together on circuit board, Pins 2-4-6-S (Shield).
- Resistor 470 ohm connects Pin 8 to Pin 3. Other Resistor 470 ohm connects Pin 7 to Pin 3. The 2 resistors allow for a dual watch receiver audio summing circuit.
- Cut Item #6 to create 1/8" jack and plug sections for PTT relay.

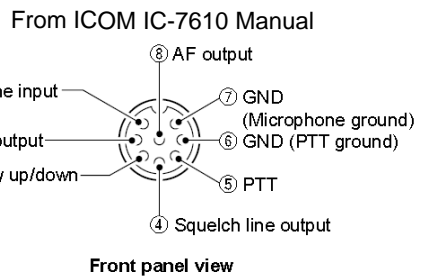
CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
--	6/21/2018	Initial release



RJ45 Socket. Use RJ45 Male to RJ45 Male Cable to plug into CS520 or W720 Base Unit



CONNECT TOGETHER TO INVOKE PTT TRANSMIT



Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

#	QTY	DESCRIPTION
1		These Refer to Item Numbers Found Listed in the Attached Bill of Materials (BoM)
K5PA DESIGN CONCEPTS		
TITLE CS520 / W720 to IC7610 Cable Adapter		
gh	A2	4000-0051
6/21/2018	SCALE	SHEET 1 of 1

Date: 6/21/2018

Bill of Materials Drawing 4000-0051 Rev --

CS520 or W720 to IC7610

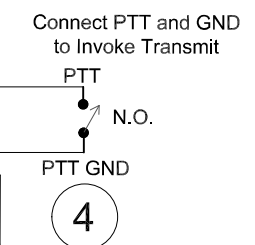
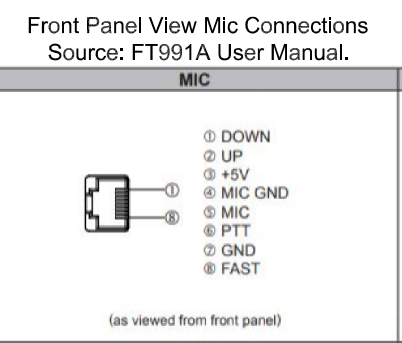
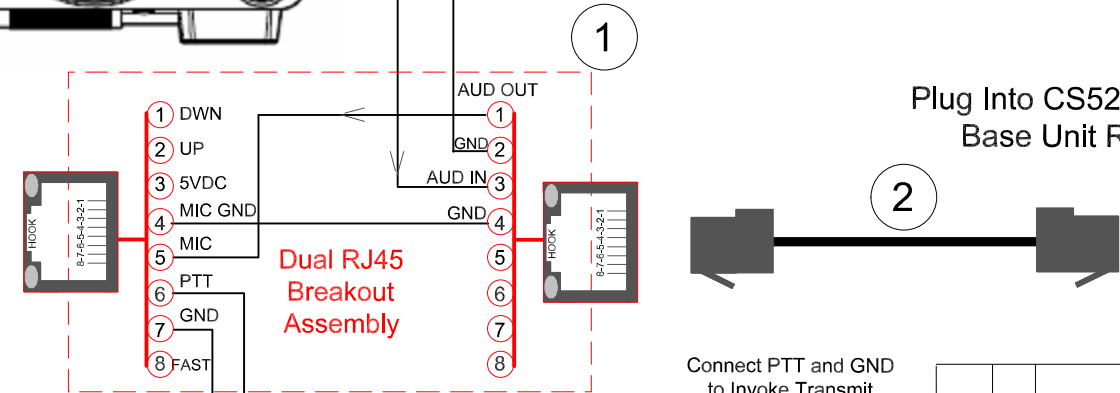
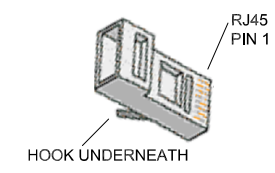
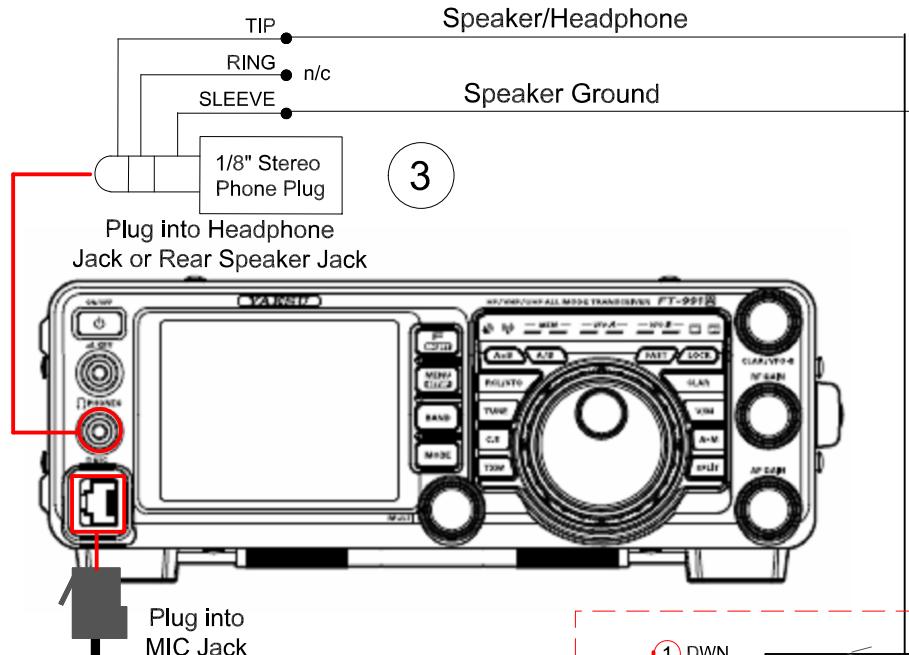
Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0051	RJ45 8P8C Right Angle Shielded Jack Breakout Board, Terminal Block Connector.	Electronics-Salon	MD-D1006R-1	Amazon	MD-D1006R-1	1
2	4000-0051	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
3	4000-0051	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
4	4000-0051	Momentary SPDT ON-(ON) Miniature Toggle Switch	NKK Switches	M2015SS1W01	2258777	2258777	1
5	4000-0051	Foster 8-pin plug connector for ICOM	Foster	2112	Univ. Radio Inc. (http://www.universal-radio.com/)	2112	1
6	4000-0051	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet	HOSA	MHE-110	Amazon	MHE-110	1
7	4000-0051	Heil Sound HW-10 - Heil Sound Heil Wire Microphone Cable, Cut to 24 Inches	Heil	HLS-HW-10	DXE HLS-HW-10	HLS-HW-10	2
8	4000-0051	Case, ABS, Economical Type 3.3x2.2x0.9" Black	Hammond	1591XXMSBK	Mouser	546-1591XXMSBK	1
9	4000-0051	Cable Matters 5 Pack, Cat6a Snagless Shielded (SSTP/SFTP) Ethernet Patch Cable in Black 3 Feet	Cable Matters	160012-BLK-3x5	Amazon	160012-BLK-3x5	1

Date: 12/5/2019

Bill of Materials Drawing 4000-0055 Rev A**Yaesu FT-991A or FT-557D to Plantonics CS520/W720 Interface**

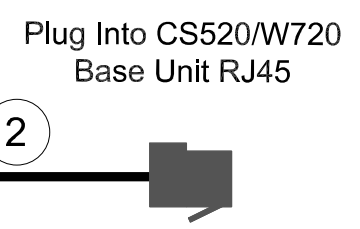
Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0055	Dual RJ45 Ethernet Connector Breakout Board w/ LED Screw terminals	MFDFLY	Breakout0028	Amazon	Breakout0028	1
2	4000-0055	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters) (OR EQUIVALENT)	C2G/Cables to Go	28690	Amazon	28690	2
3	4000-0055	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet (Note: Cut in Half to Create Each End Type Required) (OR EQUIVALENT)	HOSA	MHE-110	Amazon	MHE-110	2
4	4000-0055	Cylewet 12Pcs 1A 250V AC 2 Pins SPST Momentary Mini Push Button Switch Normal Open (Pack of 12) CYT1078 (OR EQUIVALENT)	Cylewet	CYT1078	Amazon	CYT1078	1
5	4000-0055	Project Box, Plastic Enclosure, Black, 3.3 x 2.2 x 0.8 inches	Hammond Mfgr	1591XXMSBK	Mouser Electronics	Go to Mouser Electronics Website (www.mouser.com) and search on their part number: 546-1591XXMSBK	1

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
-	12/4/2019	Initial release
A	12/5/2019	Added FT-857D Reference



Note: 1/8" Plug/Jack is same as 3.5 mm

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.



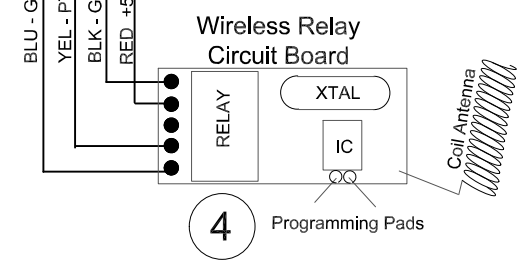
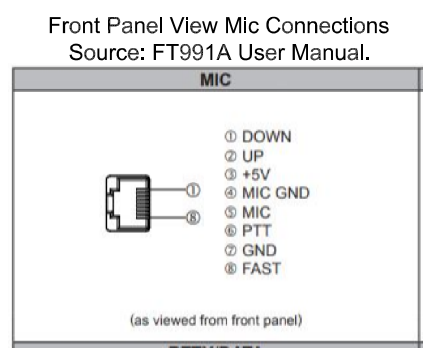
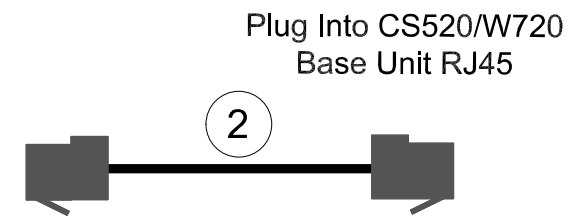
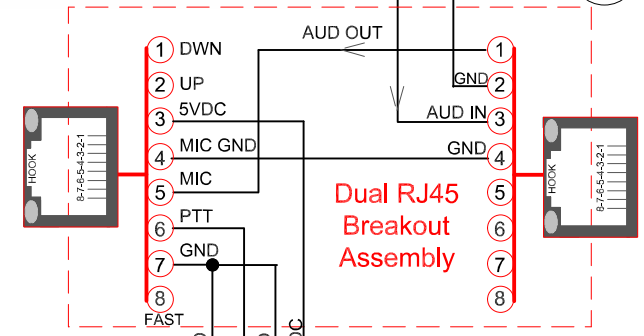
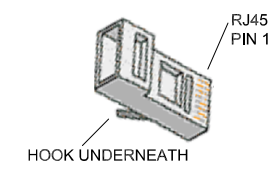
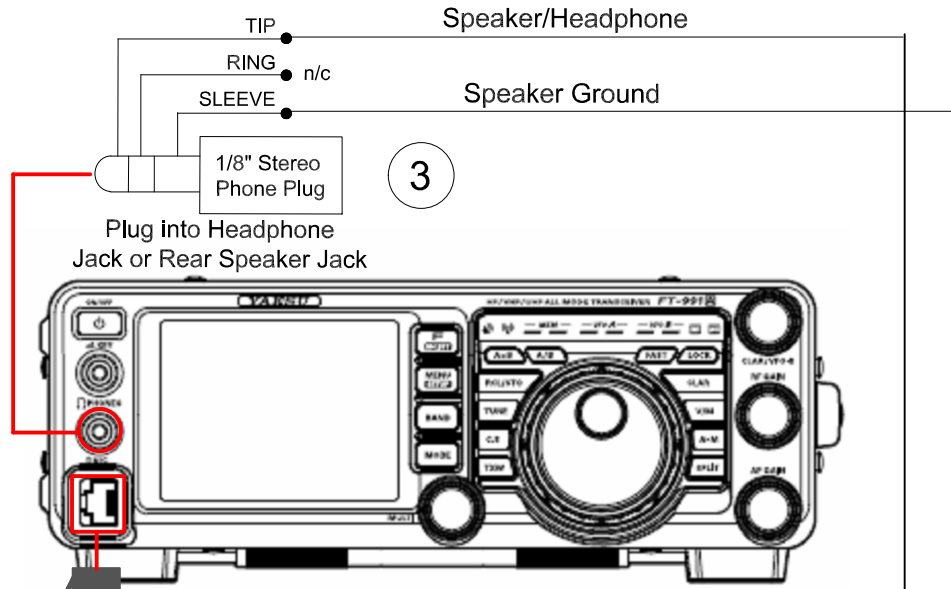
1	1	REFER TO BILL OF MATERIALS (BOM) ATTACHED
ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE YAESU FT-991A or FT-857D CABLE TO PLANTRONICS CS520 / W720		
gh	A2	4000-0055
12/5/2019	SCALE	SHEET 1 of 1

Date: 12/5/2019

Bill of Materials Drawing 4000-0055 Rev A**Yaesu FT-991A or FT-557D to Plantonics CS520/W720 Interface**

Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0055	Dual RJ45 Ethernet Connector Breakout Board w/ LED Screw terminals	MFDFLY	Breakout0028	Amazon	Breakout0028	1
2	4000-0055	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters) (OR EQUIVALENT)	C2G/Cables to Go	28690	Amazon	28690	2
3	4000-0055	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet (Note: Cut in Half to Create Each End Type Required) (OR EQUIVALENT)	HOSA	MHE-110	Amazon	MHE-110	2
4	4000-0055	Cylewet 12Pcs 1A 250V AC 2 Pins SPST Momentary Mini Push Button Switch Normal Open (Pack of 12) CYT1078 (OR EQUIVALENT)	Cylewet	CYT1078	Amazon	CYT1078	1
5	4000-0055	Project Box, Plastic Enclosure, Black, 3.3 x 2.2 x 0.8 inches	Hammond Mfgr	1591XXMSBK	Mouser Electronics	Go to Mouser Electronics Website (www.mouser.com) and search on their part number: 546-1591XXMSBK	1

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
-	12/8/2019	Initial release



Notice: There is no implied warranty that the information present is free from error and the user of this information should validate its accuracy and usage in their intended applications.

1	1	REFER TO BILL OF MATERIALS (BOM) ATTACHED
ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS TITLE YAESU FT-991A or FT-857D CABLE TO PLANTRONICS CS520 / W720 WITH WIRELESS PTT		
gh	A2	4000-0056
12/8/2019	SCALE	SHEET 1 of 1

Date: 12/8/2019

Bill of Materials Drawing 4000-0056 Rev -

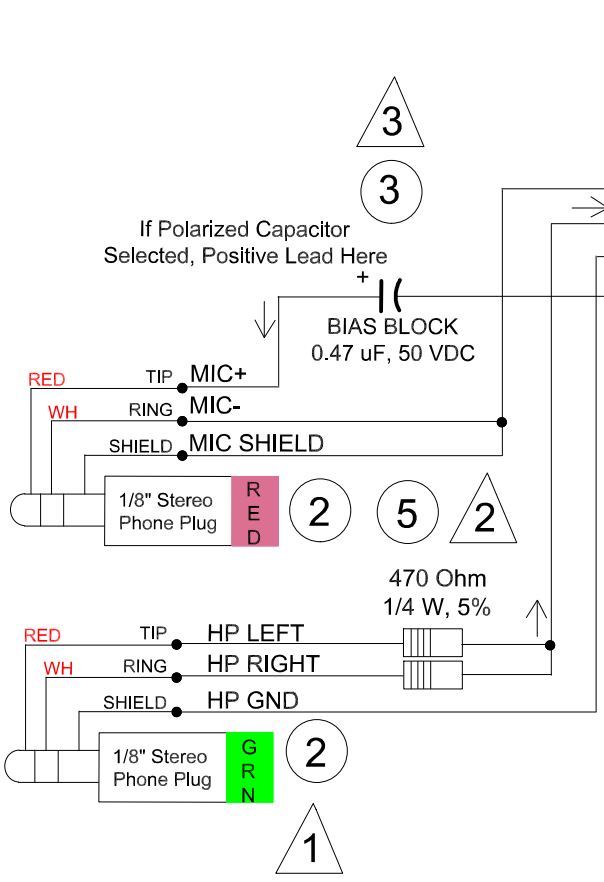
Yaesu FT-991A to Plantonics With Wireless PTT

Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0056	Dual RJ45 Ethernet Connector Breakout Board w/ LED Screw terminals	MFDFLY	Breakout0028	Amazon	Breakout0028	1
2	4000-0056	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters) (OR EQUIVALENT)	C2G/Cables to Go	28690	Amazon	28690	2
3	4000-0056	Hosa MHE-110 3.5 mm TRS to 3.5 mm TRS Headphone Extension Cable, 10 feet (Note: Cut in Half to Create End Type Required) (OR EQUIVALENT)	HOSA	MHE-110	Amazon	MHE-110	1
4	4000-0056	Wireless Remote Control Relay Switch, 433MHZ 12V, Waterproof Transmitter Momentary Switch RF Relay (1 Transmitter & 1 Receiver) DC3.7V 4.5V 5V 6V 7.4V 9V 12V	Fu Shi	ASIN: B07F9QN2QQ	Amazon	Wireless Relay	1
5	4000-0056	Project Box, Plastic Enclosure, Black, 3.3 x 2.2 x 0.8 inches	Hammond Mfgr	1591XXMSBK	Mouser Electronics	Go to Mouser Electronics Website (www.mouser.com) and search on their part number: 546-1591XXMSBK	1

NOTES #

1. Cut Item #2 cable to length 60 inches from 1/8" plug end. Use both halves for cables.
2. Resistors create an audio left/right channel summing circuit for split receiver operation
3. Bias voltage blocking capacitor may be omitted if bias voltage is turned off in the FLEX radio

CHANGE HISTORY		
VERSION	DATE	DESCRIPTION
A	4/28/2020	Initial release



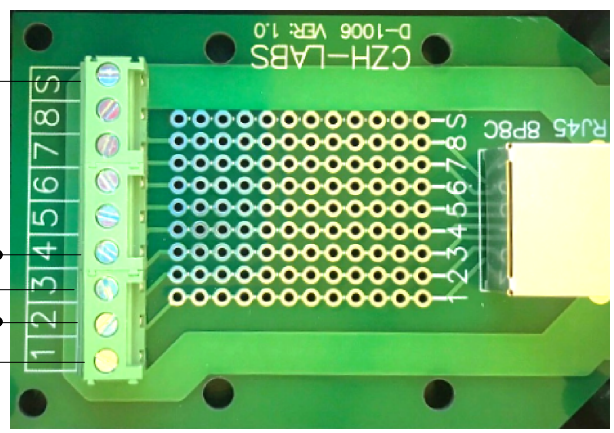
REFERENCES IN RELATION TO RADIO CONNECTIONS

MIC COMMON / Wire to Pin 4

HP OUT / Wire to Pin 3

HP COMMON / Wire to Pin 2

MIC AUDIO / Wire to Pin 1



RJ45 Socket. Use RJ45 Male to RJ45 Male Cable to plug into Plantronics W02 Base Unit



Alternate P/N for Breakout (Note Pin Numbers are Reversed)

5	2	Resistor, 470 OHM, 1/4 W, 5% Ohmite OD471JE, Mouser P/N 588-OD471JE
4	1	Project Box, 3"x2"x1" (LWH) O.D., or Equivalent, Amazon
3	1	Capacitor, 0.47 uF 50V, X7R, 10% Source: Jameco 544948, AVX SR305C474KAA, Optional, See Notes.
2	1	1/8" Stereo Right Angle Phone Plug-Plug, 10 Feet, Cut in Half. Source: Universal Radio Inc., P/N 44-468
1	1	Alternate Part Number. Amazon Ethernet Connector Breakout Board Screw Terminal Board Shielded by MDFLY Item No. 4330131998
1	1	RJ45 Shielded Breakout Board. Electronics Salon P/N MD-D1006R-1, Amazon

ITEM	QTY	DESCRIPTION
K5PA DESIGN CONCEPTS		
TITLE Plantronics WO2 Base to Flex 6400/6600		
gh	A2	4000-0057
04/28/2020	SCALE	SHEET 1 of 1

Notice: There is no implied warranty that the information present is free from error and the user of this information should validate it's accuracy and usage in their intended applications.

Date: 4/30/2020

Bill of Materials Drawing 4000-0057 Rev A

FLEX 6400/6600 to Plantronics W720

Item	Part No.	Part Description	Mfgr	Part No.	Vendor	URL of Vendor P/N	Qty
1	4000-0057	RJ45 Shielded Breakout Board. Electronics Salon	Electronics Salon	43237-2	Amazon	RJ45 8P8C Jack	1
1 Alternate	4000-0057	Ethernet Connector Breadout Board Screw Terminal Board Shielded	MDFLY	4330131998	Amazon	MDFLY Breakout	1
2	4000-0057	Mini to mini 3 cond cbl, 6 ft. (cut and discard both ends, need cable only for Foster cable)	Philmore	44-468	Univ. Radio Inc. (http://www.universal-radio.com/)	4103	2
3	4000-0057	0.47 uF 50V, X7R, 10%	AVX	SR305C474KAA	Mouser	581-SR305C474KAA	1
4	4000-0057	Project Box, Plastic Enclosure, Black, 3"x2"x1" (LWH) O.D., (OR EQUIVALENT)			Amazon		1
5	4000-0057	Resistor, 470 Ohms, 1/4W, 5%	Ohmite	OD471JE	Mouser	588-OD471JE	2
6	4000-0057	C2G/Cables to Go 28690 Cat5E Molded Shielded (STP) Network Patch Cable, Black (3 Feet/0.91 Meters) (OR EQUIVALENT)	C2G/Cables to Go	28690	Amazon	28690	1