

Sigtronics Auto Squelch Intercom System

Installation and Operating Instructions Models SAS-440 and SAS-640

INTRODUCTION

ATTENTION INSTALLER: To assure a trouble free installation, please read the entire instructions through once before beginning.

WORLDS FIRST AND ONLY VOICE ACTIVATED INTERCOMS WITH AUTOMATIC SQUELCH!

Once again Sigtronics is first. First with VOX, now first with Auto Squelch. One touch and the VOX squelch level is perfectly set to your headsets and the aircraft background noise level.

All of our products are "systems designed" to provide reliable, fail-safe products at the lowest possible cost. And we stand behind our products to guarantee your satisfaction!

The Sigtronics Models SAS-440 and SAS-640 Auto Squelch intercom systems are specifically designed for permanent, panel mounted installation in aircraft. The SAS units allow both pilot and co-pilot to operate the aircraft radios and have the convenience of voice activated intra-cabin communication. Optional passenger connections are provided that allow up to four additional intercom positions, depending on model.

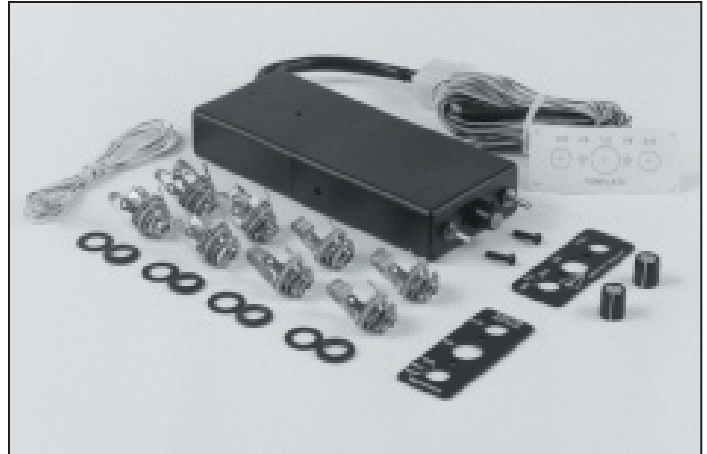
SIGTRONICS AUTO SQUELCH (SAS) INTERCOM SYSTEM FEATURES:

VOICE ACTIVATED feature allows "hands free" intercommunication between pilot(s) and passengers. Start speaking and the intercom instantly turns on to relay your message clearly to the other headsets; stop talking and it turns off to reduce background noise. There's no need to raise your voice or turn your head to communicate.

UP TO FOUR POSITION INTERCOM is provided with the model SAS-440. Model SAS-640 handles up to six positions.

AUTOMATIC SQUELCH - Another Sigtronics first. Just press and release the squelch button and the intercom perfectly sets the squelch level. In approximately one second the unit monitors the current aircraft noise level via all the headsets and adjusts the squelch for perfect voice activated operation. No more manual adjusting.

TRANSMIT CAPABILITY allows both pilot and co-pilot to transmit to air traffic control via their push-to-talk switches and headset boom mics. The intercom function is automatically disabled during transmitting, so that only the voice of the person transmitting can be heard.



PILOT ISOLATE MODE - The pilot can set the intercom so that he can transmit and receive on the aircraft radio(s) independently from the rest of the intercom. The co-pilot and passengers can still intercom among themselves and not be heard by the pilot. Conversely, they won't hear the aircraft radios or the pilot. This can be an advantage in areas of busy radio traffic.

RADIO MONITORING capability allows radio output to be heard by the pilot, whether the SAS unit is in "ALL", "ISO", or "OFF" mode.

COMPATIBILITY - All Sigtronics Auto Squelch intercoms operate with all standard aircraft radios and headsets.

FAIL-SAFE feature provides the pilot with the ability to transmit on the aircraft radios even if the unit is "OFF".

EASY UPGRADE - In most cases just enlarge one mounting hole and re-route one wire in an existing SPA-400 or SPA-600 installation and get the latest technology in aircraft intercoms.

WEIGHT: 6.4 ounces (SAS-440 intercom unit with panel and knobs). Jacks and wiring harness weigh 5.5 ounces.

SIZE: Panel 1" x 2.5". Chassis - 1" high x 2.5" wide x 6" deep. Can be mounted either horizontally or vertically in the aircraft panel.

INPUT POWER: 11 VDC through 32 VDC. Maximum current drain 0.06 Amp (SAS-440).

DISTORTION: Less than 1% total harmonic distortion.

ENVIRONMENTAL: Meets requirements of TSO-C50b.

WARRANTY: The SAS units are constructed of high quality components and carry a five year parts and labor warranty.

MADE IN THE USA



Specialists in "SOUND" Management

178 East Arrow Highway, San Dimas, CA 91773 (909) 305-9399

CHASSIS INSTALLATION

To upgrade an existing SPA-400 installation to a SAS-440 or a SPA-600 to SAS-640 skip to the "UPGRADING A SPA INSTALLATION TO A SAS" section on page 3. For a completely new intercom installation continue below.

Hardware Supplied

Besides the intercom unit and these instructions, each SAS system comes with the following hardware:

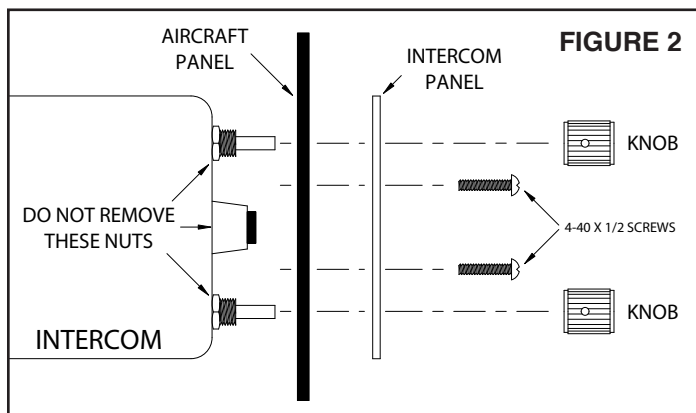
	SAS-440	SAS-640
Headphone Output Jacks - Accept standard 0.250" aircraft headphone plugs.	4	6
Microphone Input Jacks - Accept standard 0.206" aircraft microphone plugs. (U93 plug compatible jacks can be used in place of the jacks provided).	4	6
Mic Jack Insulating Washers, Flat	4	6
Mic Jack Insulating Washers, Shoulder	4	6
Intercom Panel - lettered on both sides.	1	1
Intercom Control Knobs	2	2
Mounting Screws 4-40 x 1/2	2	2
Drill Template - Adhesive backed hole size pattern for drilling aircraft panel.	1	1
Aircraft / Intercom Interface Cable (4 feet long)	1	1
Single White / Green Wire with pin (4 feet long)	1	1

UNIT PLACEMENT

The SAS unit has been designed to mount either horizontally or vertically in your aircraft panel.

The location selected for the SAS unit requires a minimum front panel area of 2 1/2" by 1". Depth required behind panel is 6" plus cable access.

CAUTION: Move the aircraft flight controls through the limits of travel while observing the selected area and making sure that the rear of the intercom and cable will not interfere with any aircraft control components.



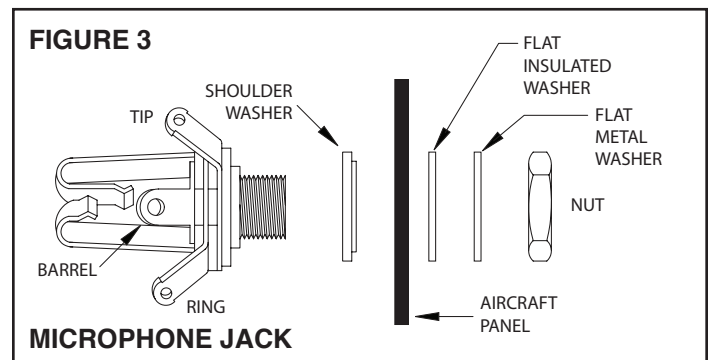
PANEL PREPARATION:

1. Position the adhesive drill template on the aircraft panel in the selected area.

2. Center punch each hole at the cross lines. (The five holes are in a straight line and equally spaced 0.4" apart).
3. Drill 1/8" pilot holes in all five places.
4. Enlarge two holes to 3/8" and one hole to 1/2" per the template.

MOUNTING CHASSIS: See Figure 2

1. Remove the knobs from the Volume and OFF/ALL/ISO controls using a 0.050" Allen wrench. NOTE: DO NOT REMOVE the nuts from the Volume, Squelch, or OFF/ALL/ISO controls.
2. Insert the SAS unit from the rear of the aircraft panel with the appropriate arrow on the unit chassis pointing upwards.
3. Install the printed SAS panel and lightly thread the two 4-40 screws through the holes in intercom panel. The nuts on the Volume and OFF/ALL/ISO controls should fit inside the 3/8" diameter holes.
4. Tighten the two screws.
5. Put the knobs on the Volume (VOL) and OFF/ALL/ISO control shafts and tighten the Allen screws.

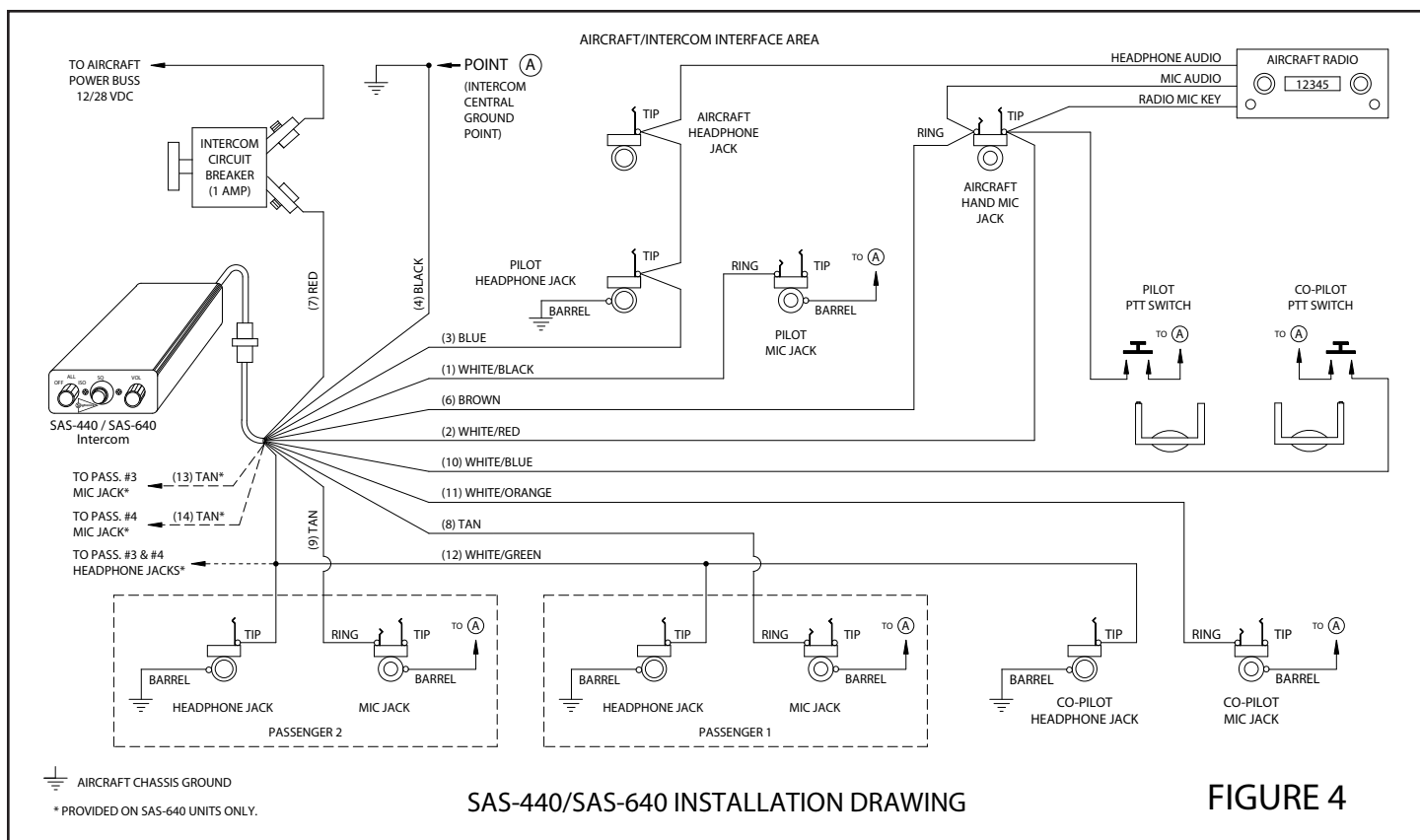


MOUNTING HEADPHONE AND MICROPHONE JACKS (See Figure 3)

1. Locate the mounting areas. (One mic and one headphone jack required for each headset). Again, make sure that the jacks will not interfere with any aircraft control components.
2. Drill 3/8" diameter holes for headphone jacks and install.
3. Drill 1/2" diameter holes for the mic jacks and install with the insulating washers supplied. (See Figure 3).

Note: If the aircraft already has pilot headset jacks, they can be used for intercom, however, the mic jack must be re-wired as follows:

1. Remove any existing wires from the tip, ring, and barrel connections.
2. Connect the intercom White / Black wire to the ring terminal.
3. Connect one end of a ground wire to the barrel terminal of the mic jack and connect the other end to Point "A".



4. Install insulating washers as necessary if the barrel of the mic jack is mounted in metal.

For the headphone jack, just add the blue wire (pin 3) to the tip terminal. No need to remove existing wires on the headphone jack.

WIRING INSTRUCTIONS

Connections should be made as shown in Figure 4 and indicated in Table 1. If longer wire lengths are required, use a good quality hook-up wire - 22 gauge or larger. Although

PIN	WIRE COLOR	FUNCTION	CONNECT TO
1	White / Black	Pilot Mic Input	Ring Terminal of Pilot Mic Jack
2	White / Red	Pilot and Radio Transmit Switch Input	Pilot Transmit Switch (PTT) & Radio Key Input (Switch to Ground to Transmit)
3	Blue *1	Pilot Headphone - Radio & Intercom Outputs	Radio Headphone Output and Tip Terminal of Pilot Headphone Jack
4	Black *2	Intercom Central Grounding Point "A"	Aircraft Chassis Ground
5	N/C	None	No Connection
6	Brown	Transmit Mic Audio Output	Ring Terminal of Aircraft Hand Mic Jack or Mic Input of Aircraft Radio or Audio Panel
7	Red *3	12 through 24 VDC Power Input	Intercom Circuit Breaker
8	Tan *4	Passenger #1 Mic Input	Ring Terminal of Passenger #1 Intercom Mic Jack
9	Tan *4	Passenger #2 Mic Input	Ring Terminal of Passenger #2 Intercom Mic Jack
10	White / Blue	Co-Pilot Radio Transmit Switch Input	Co-Pilot Transmit Switch (PTT) (Switch to Ground to Transmit)
11	White / Orange	Co-Pilot Mic Input	Ring Terminal of Co-Pilot Intercom Mic Jack
12	White / Green	Co-Pilot & Passenger Intercom Headphone Output	Tip Terminal of Co-Pilot & Passenger Headphone Jacks
13	Tan *5	Passenger #3 Mic Input	Ring Terminal of Passenger #3 Intercom Mic Jack
14	Tan *5	Passenger #4 Mic Input	Ring Terminal of Passenger #4 Intercom Mic Jack

not necessary, shielded audio wire can be used if desired. This can simplify the wiring process.

- *1. The blue wire from Pin 3 must be connected to the aircraft radio headphone output - NOT the speaker output.
- *2. Connect all intercom mic jack grounds to a single aircraft chassis ground point - Point "A" - as shown in Figure 4. (Use the black washers supplied to insulate the intercom mic jacks from aircraft chassis ground). Note this intercom central grounding point is used to eliminate any unwanted electrical noises, such as alternator whine or strobe noise, from being induced into the intercom system through the grounds. All intercom mic jack barrels must be insulated from ground where they are mounted and connected back to Point "A" on their own individual ground wire. Similarly, both intercom ground wires (pin 4) and the push-to-talk switch grounds must also be connected back to Point "A". It is not necessary, however, to connect the headphone jack barrels to Point "A". They can either be grounded where they are mounted or some place nearby.
- *3. The red wire may be connected to either 12V (14V) or 24V (28V) power source. No switching or adjustments are required to operate from either source.
- *4. Tan wires (pins 8 and 9) are only used on installations that require extra intercom positions.
- *5. Provided on SAS-640 units only.

Skip down to the INSTALLATION CHECK OUT AND ADJUSTMENTS section on page 4.

UPGRADING A SPA INSTALLATION TO A SAS

Chassis Mounting

The SAS-440 is specifically designed to easily replace a SPA-400. Similarly, the SAS-640 can replace a SPA-600. The panels are exactly the same dimensions (1" x 2.5"), however the SAS units are 1 3/4" longer than the SPA units. You will have to make sure that you have the extra depth required behind your panel. The five mounting holes are exactly in the same positions. Only the center hole will have to be changed (enlarged from 1/4" to 1/2").

To upgrade, first remove the SPA unit from the aircraft panel. This is done by unscrewing the two Phillips head screws and the nut on the ON/OFF switch. Remove the printed SPA panel. Pull the SPA unit out and unplug the white connector from the wiring harness. Next, drill the center hole in the aircraft panel out to 1/2". Then to mount the SAS chassis (see Figure 2 on page 2):

1. Remove the knobs from the Volume and OFF/ALL/ISO controls using a 0.050" Allen wrench. NOTE: DO NOT REMOVE the nuts from the Volume (VOL), Squelch (SQ), or OFF/ALL/ISO controls.
2. Insert the SAS unit from the rear of the aircraft panel with the appropriate arrow on the unit chassis pointing upwards.
3. Install the printed SAS panel and lightly thread the two 4-40 screws through the holes in intercom panel. The nuts on the Volume and OFF/ALL/ISO controls should fit inside the 3/8" diameter holes.
4. Tighten the two screws.
5. Put the knobs on the Volume and OFF/ALL/ISO control shafts and tighten the Allen screws.

Wiring Change

The only wiring change to an existing SPA installation is to rewire the co-pilot and passenger(s) headphone lines. You will not need the 4 foot interface cable that comes with the SAS system. Instead, you will use the SPA harness already in the aircraft. Find the single white / green wire with female pin (supplied). Push the pin into the vacant hole at pin 12 next to the white / orange wire in your existing SPA interface harness. Make sure it is in as far as the other pins and does not pull out. Then plug the cable on the SAS unit into the modified SPA interface cable.

In an SPA installation, the tip terminals of the co-pilot and passenger headphone jacks are wired to the blue wire (pin 3). They need to be disconnected from there and connected to the white / green wire (pin 12) (see Figure 4 on page 3). Make sure that the blue wire (pin 3) is still connected to the tip of the pilot's headphone jack as well as to the radio headphone line.

INSTALLATION CHECK-OUT AND ADJUSTMENTS

After the unit is installed, again check that the SAS unit

chassis, jacks, and wiring harness are clear of all aircraft operating controls and cause no interference with them. Check out the SAS unit installation by following the instructions below.

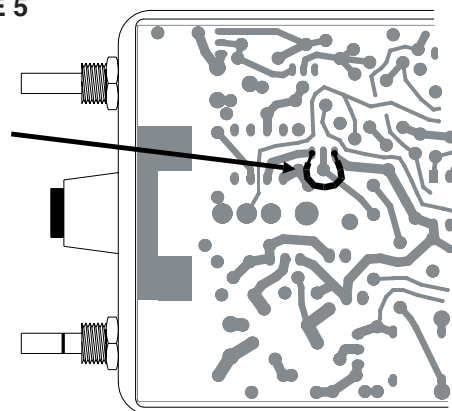
Plug in all the headset mic and phone plugs into the respective intercom jacks. Put on the pilot's headset and position the boom mic close to the mouth, as is the practice with a hand-held mic. Voice clarity is best when the mic is at one side of the mouth and 1/4" from the lips.

To assure that the aircraft radios, pilot's headset, and PTT switch are connected and functioning properly, turn the SAS units OFF/ALL/ISO switch to the "OFF" position. If applicable, set the aircraft audio panel to "Headphone" position. Then turn on the aircraft radio(s) as usual, and verify that the pilot can hear the radios and can transmit using his push-to-talk switch and headset. Aircraft radio(s) and audio panel should operate exactly as they did before the SAS system was installed. Aircraft radio reception should not be heard in the co-pilot or passenger headsets. There should be no intercom between headsets with the SAS unit turned "OFF".

Next turn the SAS unit OFF/ALL/ISO switch to the "ALL" position. Set the SAS volume control to mid-position. Verify that all headset positions can now intercom with each other, including the passengers. Verify that both pilot and co-pilot can operate the aircraft radio(s). In this mode all headsets on the intercom will hear the aircraft radio(s).

It may be necessary at this time to adjust the SAS unit mic output to the aircraft radios. A small adjustable potentiometer is provided inside the unit for this purpose. It is accessible through a hole in the side of the SAS chassis. It is marked "Mod. Adj.", and can be adjusted with a small blade screwdriver. In the event of over-modulation (garbled) or reports of weak transmissions over the aircraft radio, an appropriate adjustment can be made. Clockwise rotation increases the output level to the aircraft radio mic input. Counter-clockwise rotation decreases modulation level. This adjustment sometimes needs to be made after the initial installation of the intercom or if a new radio is installed. (The output is set for unity gain at Sigtronics).

FIGURE 5



SIDETONE MOD.

If everything checks out, refer to the OPERATING INSTRUCTIONS on page 5 for proper use and other operating modes of the Sigtronics SAS intercom system. If something does not work as above, carefully go over the intercom wiring again. If OK, refer to the following sections for solutions to two of the most common intercom problems:

SAS-440 / SAS-640 SIDETONE MODIFICATION

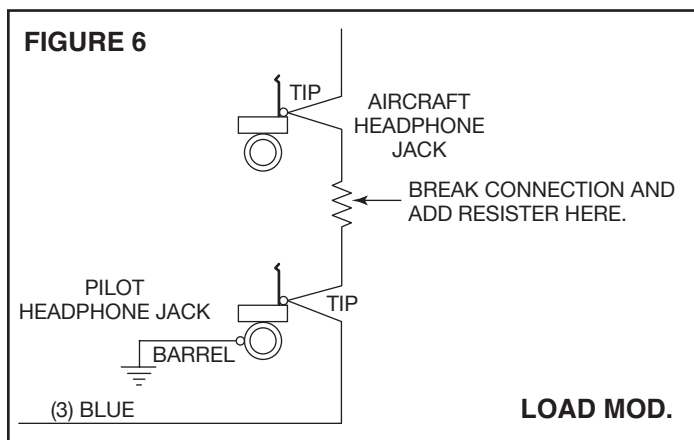
Most aircraft radios, when transmitting, provide what is called "sidetone". Without sidetone, you will not hear yourself or your co-pilot transmit to ATC. This can be distracting, especially during instruction, because no one on the intercom will hear the outgoing transmission of the radio conversation. Some aircraft radios, however, do not provide this function. Also, some radios are designed to drive only one headset. Therefore, if you have such a radio, the sidetone may be extremely weak or nonexistent.

If this is the case and the sidetone cannot be turned up in the radio(s), a simple modification can be performed within the SAS unit to simulate sidetone. The SAS requires partial disassembly to accomplish this modification. First unplug and remove the SAS unit from the aircraft. To disassemble unit, carefully remove the four screws securing the bottom cover. Remove the cover to expose the solder side of the circuit board.

Solder in an insulated jumper wire as illustrated in Figure 5 on page 4. Replace the cover and the four screws to complete the modification.

With the unit modified in this way, the intercom volume control adjusts the level of the sidetone. Additionally, when in "ISO" mode, the SAS unit will not provide sidetone even with this modification.

Install the SAS unit into the aircraft panel and plug in the cable.



SAS-440 / SAS-640 ICS LOAD MODIFICATION

This modification is used when a SAS intercom is connected to a radio or audio panel which has a low impedance headphone output (less than 100 ohms). This is most common with some Narco equipment (CP-135, CP-136, and Mark 12D, for example) and "home made" audio select panels.

Symptoms are:

1. Intercom audio volume is weak or non-existent when the SAS unit is in "ALL" mode but fine in "ISO" mode and ...
2. Transmit function is normal on aircraft radio and ...
3. Receive function is normal on aircraft radio.

Solution: Add a 1/4 or 1/2 watt resistor per Figure 6 above. The value of the resistor most commonly used is 220 ohms, however, optimum performance can be achieved by selecting the value right for your particular installation. The resistor can be any value between 100 and 330 ohms and is selected for the best balance between radio receive volume and intercom volume.

If something is still not right or you have any questions regarding the installation and operation of the Sigtronics SAS intercom or any other Sigtronics product feel free to contact us directly. Technicians are available Monday through Friday 8 am to 4:30 p.m. Pacific time.

This concludes the installation check-out.

OPERATING INSTRUCTIONS

The Sigtronics Transcom SAS-440 / SAS-640 is a voice actuated intercom for aircraft with "transmit through the aircraft radio capability" using your push-to-talk switches. Three controls are provided on the SAS units:

OFF/ALL/ISO Switch - Sets the intercom mode of operation.

VOL - Volume Control - Controls the intercom volume. (Does not affect aircraft radio volume. Set radio volume on radio as normal.)

SQ - Squelch Button - Automatically sets the intercom turn-on threshold for voice activated intercom (VOX) mode.

CAUTION - As is standard practice with all aircraft avionics equipment, be sure that the aircraft radio master switch is turned off when you start up the aircraft engine.

INTERCOM OPERATION

Intercom operation and adjustment can be performed by the following procedure:

1. With aircraft power on, set the SAS OFF/ALL/ISO switch to the "ALL" position - the preferred mode for setting the squelch. The SAS squelch level can also be set with the SAS in the "ISO" mode, but the pilot headset audio will not be utilized for squelch level setting.
2. Turn the SAS unit volume control to the 9 o'clock position. Notice the intercom is now continually activated (hot mic mode) and you should be able to talk between headsets.
3. To adjust the intercom squelch control for voice activated operation (VOX), press and hold the "SQ" button down. Now announce to the other persons in the aircraft not to talk because you need a moment to set the intercom.

When all are silent release the “SQ” button. The intercom will immediately go quiet. In approximately one second the intercom will briefly pop on. This tells you the squelch has finished automatically setting. If someone did speak while the intercom was setting, it will have to be set again. This is because the intercom would have tried to set to a level just above the persons voice level instead of just above the aircraft background noise level.

Once set, the intercom stays silent until someone speaks in their headset microphone (mic). Then it instantly turns on and relays the conversation. After about a second of no conversation the intercom goes silent again.

In most aircraft the squelch level wont need to be set again until the next flight. In some high noise aircraft it is better to set the squelch during climb or cruise.

HOT MIC MODE

When the SAS intercom turns on, it automatically comes up in “hot mic” mode (non voice activated mode). During a flight, if you want to deactivate the voice activated mode and return to hot mic mode, simply turn the OFF/ALL/ISO switch to “OFF” and wait 3 seconds and then turn it back to “ALL” or “ISO”. To facilitate automatic setting of the squelch level, whenever the “SQ” button is held down, the intercom also goes into hot mic mode.

RADIO TRANSMIT MODE

When the SAS is in the “ALL” mode, transmitting from both pilot and co-pilot positions is possible on a one-at-a-time basis. As normal, the pilot selects the appropriate radio he wishes to use. When the pilot presses his PTT switch, his headset mic is automatically routed through the intercom

to the radio. Only his mic will be live. The microphones of the co-pilot and any passengers, will be muted when the pilot transmits. Similarly in the “ALL” mode, when the co-pilot transmits, only the co-pilots mic will go out on the radio. When transmitting, the pilots will hear their own voice via the aircraft radio sidetone return. (If the radio does not provide transmit sidetone, then you will not hear your voice. A minor modification to the SAS unit will enable it to simulate sidetone. (See “SAS-440 / SAS-640 SIDETONE MODIFICATION” on page 4)

When the SAS is set to the “ISO” mode, only the pilot can transmit and receive on the aircraft radio(s). The pilot will not hear intercom and cannot talk to the other headsets. The co-pilot and passengers still have intercom, but do not hear the radios.

SOLO FLIGHTS

Since the intercom is not needed during solo flights, it may be turned “OFF”. The pilot will still hear the aircraft radio(s), since this circuit is always active, and may transmit to ATC via his headset and push-to-talk switch.

FAIL-SAFE

If power to the SAS unit fails, the pilot can still transmit and receive on the a/c radio(s) (assuming the radio(s) are still functioning). Additionally, if a problem is ever suspected in the intercom, simply turn it to “OFF”. In this mode you will also be able to transmit and receive on the aircraft radio(s) from the pilot’s position. The hand mic may also be used, however, the SAS unit should be turned to “OFF” and you should unplug your headset mic plug from the mic jack. (Leave headphone plug in for radio reception).



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