

SEAREY HARNESS

INSTALLATION MANUAL for SEAREY AMPHIBIAN AIRCRAFT

P/N 2076 (914 version) & PN 2077 (912 version)

SPECIFICATION IP-2076-914 SeaRey
SPECIFICATION IP-2077-912 SeaRey

REV. 14

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Approved

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For Experimental Category Aircraft Only. Not FAA Approved

I. INTRODUCTION

This manual provides information for installing and operating the ACI SeaRey Harness on a SeaRey or similar experimental aircraft. All installation work should be performed in accordance with this manual and applicable sections of AC 43.13 - 1B.



II. SYSTEM DESCRIPTION

THE BASIC HARNESS: The ACI SeaRey Harness is composed of bundled lengths of shielded and unshielded Tefzel wire precut and branched according to a pre-established layout plan, service loads and SeaRey systems locations (see pages 7 and 10.) It includes #4 starter and ground cable, transponder and transceiver coax, pitot, AOA and manifold pressure tubing (2076-914 only). The Harness breaks at wing root connectors and then extends through both wings for LED nav/strobes. The port wing harness includes wiring for an HID or LED landing light plus AOA and pitot tubing. ELT wiring is not included in the harness.

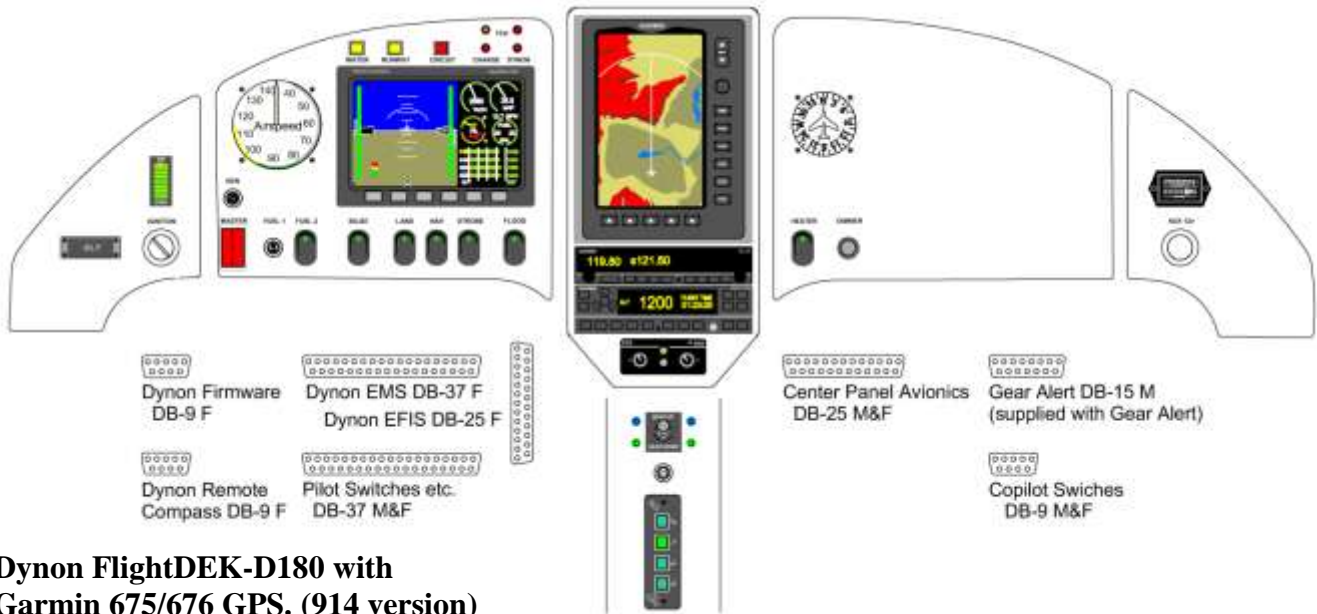
The 2076-914 Harness supports a Rotax 914UL turbo-powered SeaRey with a full options list. There is provision for headset jacks in the baggage area, turbo shutoff and panel floods on the windscreen support and a cabin heater in the nose or behind the seats. Choosing different locations for services may require additional wiring by the builder with recalculation of circuit length voltage losses. However, for installations without a full center console, ACI also provides the flexibility to position a flap controller and gear control (switch, breaker and position lights) on the main instrument panels or panel end wings. ACI has a lighter 2077-912 Harness with a full options list for the less complex Rotax 912 or 912S-powered aircraft.

III. THE WIRE LIST DOCUMENT

There is a separate Wire List document included with the harness providing detailed information on each wire in the harness. The harness has identification on both ends of each wire. The labeling refers to the origin and destination areas (as indicated on the “SeaRey Harness Plan”, below.) The Wire List document confirms the wire type and gauge, locates the ends of each wire according to each designated area on the Harness Plan, and provides specific information on the DB connector pin or connection terminal. Wire List location “Notes” cover special installation requirements and clarifications.

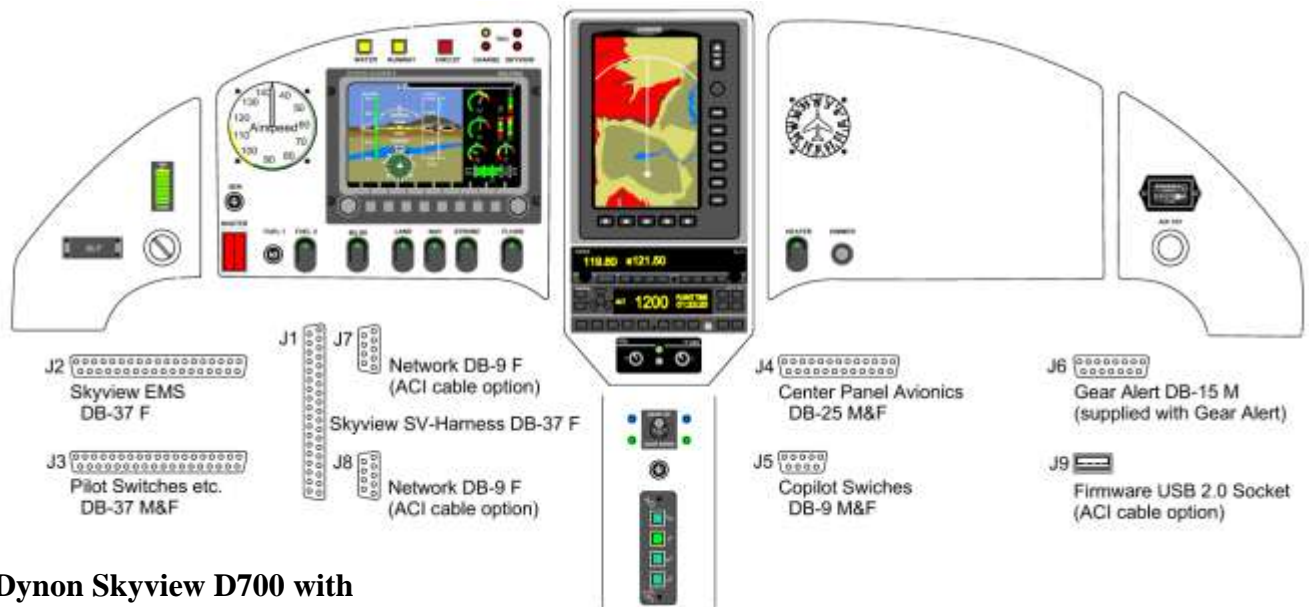
Although the Basic Harness is essentially the same for a variety of installations, the connections at the instrument panel end can be quite different. Therefore, ACI provides a specific (17-page) Wire List for each of the following installations:

- a. Dynon FlightDEK-D180 with Garmin 675/676 GPS (either 914 or 912 engines.)
- b. Dynon Skyview D700 with Garmin 675/676 GPS (either 914 or 912 engines.)
- c. Dynon Skyview D1000 with Dynon SV-GPS-250 (either 914 or 912 engines.)
- d. Dynon D6 (Analog) with Garmin 496/560 GPS (either 914 or 912 engines.)



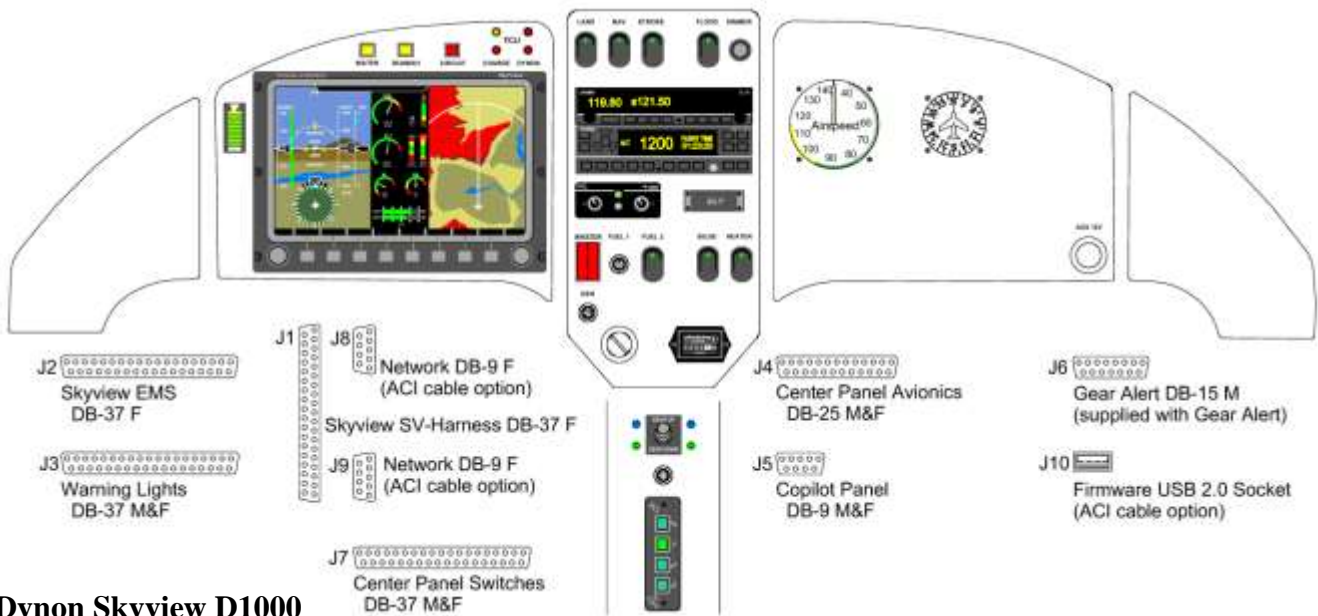
Dynon FlightDEK-D180 with Garmin 675/676 GPS. (914 version)

This SeaRey Harness Wire List includes a guide for connecting eight DB connectors behind the panel. The optional Harness Installation Kit contains these connectors and therefore there is no requirement to purchase cables from Dynon for the FlightDEK-D180. The “Pilot Switches” DB-37 (male and female), “Center Panel Avionics DB-25 (male and female) and “Copilot Switches DB-9 (male and female) connectors are normally mounted on an optional Harness Support Tray just ahead of the rudder pedals.



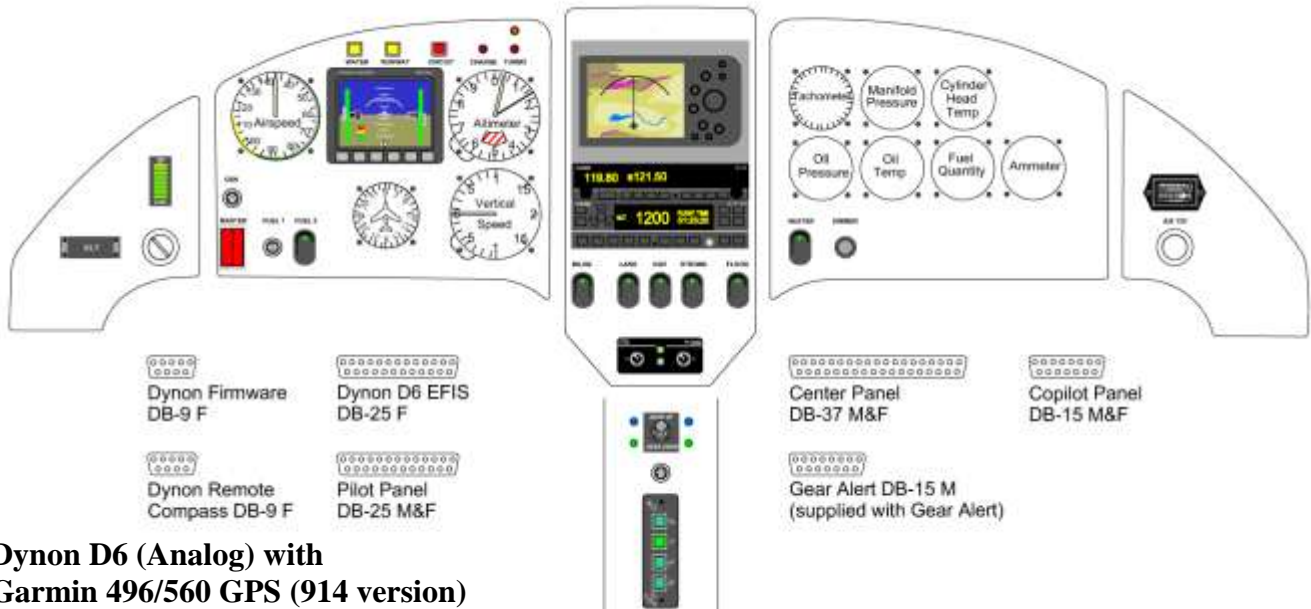
Dynon Skyview D700 with Garmin 675/676 GPS (914 version)

This Wire List includes a guide for connecting six DB connectors and one USB cable. The optional Harness Installation Kit has these connectors and with the optional ACI Network and USB cables, the installer can save \$100 by ordering the Skyview D700 without harness and cables. Don’t be daunted by the large number of DB pins. If you solder your own D700 harness you’ll likely use 15 of 37 pins. The “Pilot Switches” DB-37 (male and female), “Center Panel Avionics DB-25 (M&F) and “Copilot Switches DB-9 (M&F) connectors are normally mounted on an optional Harness Support Tray.



**Dynon Skyview D1000
With Dynon SV-GPS-250 (914 version)**

This Wire List includes a guide for connecting seven DB connectors and one USB cable. The optional Harness Installation Kit has these connectors and with the optional ACI Network and USB cables, the installer can save by ordering the Skyview D1000 without harness and cables. Don't be daunted by the large number of DB pins. If you solder your own D1000 harness you'll likely use 15 of 37 pins. The EMS DB37 will use 11 to 14. The "Warning Lights" DB-37 (male and female), "Center Panel Avionics" DB-25 (M&F), "Center Panel Switches" DB-37 (M&F) and "Copilot Panel" DB-9 (M&F) connectors are normally mounted on an optional Harness Support Tray.



**Dynon D6 (Analog) with
Garmin 496/560 GPS (914 version)**

This Wire List includes a guide for connecting seven DB connectors. The optional Harness Installation Kit permits the installer to order the Dynon D6 without a Dynon harness. All the analog instruments are available as a kit from Progressive Aerodyne. The "Pilot Panel" DB-25 (M&F), "Center Panel" DB-37 (M&F) and "Copilot Panel" DB-15 (M&F) connectors are normally mounted on an optional Harness Support Tray.

IV. OPTIONAL ACI EQUIPMENT

Builders can also choose to supplement the harness with a Harness Support Tray, Harness Installation Kit, ACI Skyview network cables, ACI USB firmware cable, engine warning LED's, gear position LED's and an Electric Gear Relay Board.

The harness is also designed to be used in conjunction with the ACI Power Buss, ACI Gear Alert and ACI *eFlaps* electric flap controller, as installed. If ordered with the harness, ACI will prewire the Power Buss and Gear Alert to the harness at no extra charge.

2084 Harness Support Tray:

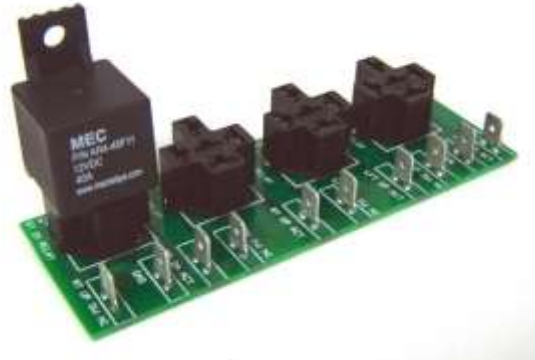
This pre-drilled aluminum tray is designed to be installed above and ahead of the rudder pedals. The Tray prevents interference with the rudder pedals and provides connections for the harness to various panel switches, instruments, radios etc. The Support Tray is also an excellent mounting platform for the 22,000uf 50v capacitor, a MAP transducer, ground terminal strips, the ACI Power Buss, terminal strips for Buss 1 & 2, the Ray Allen REL-2 trim relay deck, the ACI Gear Alert and Skyview EMS, ADAHARS and SV backup battery . The Harness Support Tray is best supported by a support tray arm kit available from Progressive Aerodyne. The builder is responsible for installing additional support as required. (**Note:** Tray component installation is subject to change and may not be as depicted.)



2086 Harness Installation Kit:

This kit provides: support tray grommets, (2) 1/4" SS bolts nuts and washers for ground connections, (5) terminal strips, (40) terminal strip jumpers, (2) double connectors for gear micro switches, (12) ring connectors (pre-installed on #4 cables), a capacitor/MAP transducer mounting plate, mounting screws for power buss and gear alert, 6 pin and 3 pin Molex connectors for wing wiring, 1 amp fuses for shunt wiring DB female connectors for the Dynon D-180 and Skyview. DB male and female connectors with covers for mounting on the Harness Support Tray. (Depending on what is ordered with the harness, some of these items may be already installed by ACI.)

2085 Gear Relay Board: This Circuit Board has mounting sockets for the four relays that come with the electric gear. As all the circuitry is contained on the compact board, the builder needs only to connect actuators, micro switches, power and ground to the Relay Board's spade terminals. The mounting tangs on the four relays provide the means to attach the board and relays to the aircraft main bulkhead.



2090 Gear Position LEDs These 12v LED kits are appropriately sized for use on the instrument panel and/or center console. The Gear position LED's have an extra wire for use with the ACI gear alert system.



2091/92 Engine Warning LEDs: The engine warning LED's (not shown) are red for charging and EFIS/EMS warnings. The 914 engine kit also includes red and yellow turbo warning LED's.



LSX Aluminum Subpanels ACI are now producing aluminum sub-panel kits to fit the molded fiberglass LSX Instrument Panel. There are up to 5 sub-panels including the center avionics section. Panels are painted a grey textured finish with professional white silk-screened lettering. Current production provides for turbo instrumentation, Dynon D-180, Dynon D-700 Skyview, Dynon D-1000 Skyview, Garmin 695/696 etc. ACI will mount your Dynon tray and install mounting brackets for Vhf and transponder trays, the Garmin GPS, and the Dynon remote compass. All mounting holes are CNC or laser cut and drilled for instruments and switches. Mounting screws with painted heads are supplied in the kit.

V. APPLICABILITY

This table provides information on Harness design assumptions, flexibility and limitations.

| Area | Service | Amps | Duty | Wire | PTC/CB | GND | Remarks |
|--|-----------------|----------|--------|--------|----------|-----------|------------------------------|
| Nose & Panel V X Y Z | Heater | < 3A | C | 22 | 3A to 5A | Panel | (nose mounted heaters) |
| | TCU LEDs | < 0.1A | I | 22 | n/a | Engine | (use TCU power) |
| | Trim Indicator | < 1A | I | 22 | n/a | Panel | B1 shared power source |
| | Flap Controller | < 1A | I | 20 | 5A | Panel | (use flap actuator power) |
| | Gear LED's | < 1A | C | 22 | n/a | Panel | (powered by Gear Control) |
| | Hour Meter | < 1A | C | 20 (c) | 1A to 5A | Engine | B2 shared power source |
| | Master Relay | < 1A | C | 22 | n/a | Panel | (powered by main battery) |
| | Starter Relay | < 1A | I | 22 | n/a | Nose | (use Regulator "C" power) |
| | Charge LED | < 0.1A | C | 22 | n/a | Regulator | (use Regulator "C" power) |
| | GPS | < 4A | C | 22 (e) | 5A | Panel | Avionics Bus (as installed) |
| | Intercom | < 0.2A | C | 22 (e) | 1A to 5A | Panel | Avionics Bus (as installed) |
| | Transponder | < 2A | C | 22 (e) | 2A to 5A | Panel | Avionics Bus (as installed) |
| | Gear Alert | < 1A | C | 22 (e) | 1A to 5A | Panel | Avionics Bus (as installed) |
| | VHF | < 3A | C | 22 (e) | 3A to 5A | Panel | Avionics Bus (as installed) |
| | Aux Outlet | < 7 A | C | 20 (e) | 7A | Panel | Avionics Bus (as installed) |
| | Avionics Ovrld. | < 0.3A | I | 22 (e) | 1A to 5A | CN2 (f) | (use Regulator "C" power) |
| | Gear CB sense | < 0.1A | I | 22 | n/a | CN22 (f) | ACI Power Buss only. |
| | Gen. CB sense | < 0.1A | I | 22 | n/a | CN23 (f) | ACI Power Buss only. |
| | Dynon D-180 | 2.2A | C | 22 | 3A to 5A | Panel | B1 shared power source |
| | Dynon Skyview | 3.5-5.0A | C | 22 | 5A | Panel | B1 shared power source |
| | Dynon LED | < 0.1A | C | 22 | 1A to 5A | Dynon | B1 shared power source |
| | Dynon D-6 | 1A | C | 22 | 1A to 5A | Panel | B1 shared power source |
| | Engine Inst. | < 1A | C | 22 | 1A to 5A | Engine | B1 shared power source |
| | Inst. Lights | < 1A | C | 22 | 1A to 5A | Panel | |
| | Rmt. Compass | n/a | C | 22 (g) | n/a | Panel | To Dynon EFIS |
| | Shunt Hi & Low | < 1A | | 22 | 1A fuses | n/a | To Dynon EMS |
| | Power Buss | < 0.5 | C | 10 | n/a | Panel | Circuit integrity system |
| Bulkhead P N M R K A | Panel Flood | < 1A | I | 12 | 1A to 5A | Bulkhead | B2 shared power source |
| | Gear Actuators | < 25A | I | 12 | 25A | Bulkhead | |
| | Gear Control | 0.3A | I | 20 | 1A to 5A | Bulkhead | B2 shared power source |
| | Fuel Sensor | < 1A | C | 20 (c) | 1A to 5A | Bulkhead | B1 shared power source |
| | Trim Actuator | < 5.6A | I | 20 | 5A | Panel | (use #18 wire for tail trim) |
| | Bilge Pump | < 2A | C | 22 | 2A to 5A | Bulkhead | |
| | Fuel Pump aux | 1 A | C | 20 | 1A to 5A | Bulkhead | |
| | Fuel Pump 914 | < 5A | C | 20 | 5A | Bulkhead | (wired to generator) |
| | Fuel Pump 914 | < 5A | C | 20 | 5A | Bulkhead | |
| | Flap Actuator | < 5.6A | I | 20 | n/a | Panel | (power from flap controller) |
| Wing & Engine W G B C E | Strobe LEDs | < 1A | C | 20 | 7A | Engine | |
| | Nav. LEDs | < 1A | C | 20 | 7A | Engine | |
| | Land. HID | < 7A | C | 14 | 11A | Engine | |
| | TCU | < 2A | C | 20 | 2A to 5A | Engine | B2 shared power source |
| | TCU Isolation | < 2A | C | 18/20 | n/a | Engine | (uses power from TCU) |
| | Gen. Output | 22A | C | 10 | 25A | Engine | |
| | Alternator | 40A | C | 8 | 50A | Engine | (as installed) |
| | Regulator "C" | 1A | C | 18 (h) | 3A to 5A | Engine | C (shared power source) |
| Ignition Cutoff | n/a | C | 18 (g) | n/a | Panel | | |
| Other T U L | PTT (sticks) | n/a | I | 22 | n/a | Panel | To avionics ground |
| | Headset Jacks | n/a | C | 22 (g) | n/a | Panel | To avionics ground |

Applicability Table Notes:

- a. **Voltage Drop:** AC 43.13-1B specifies wire sizing to limit voltage drop attributable to circuit length. The SeaRey Harness assumes that each circuit essentially ends where it joins #4 ground cable in one of three locations: the Instrument Panel/Nose, Main Bulkhead behind the seats or the Engine. If the installer lengthens the circuit by locating or grounding the service at a different location the wire gauge may have to be increased.
- b. **Circuit Protection:** The generic term “current limiter” will be used to designate a fuse, circuit breaker or PTC (Polyswitch). PTCs carry overloads slightly longer than thermal breakers. A 5 amp PTC will carry a 200% overload for about 90 seconds and a 400% overload for 5 seconds before tripping. A 5 amp current limiter protects #22 gauge (and heavier) wire. A 7 amp current limiter protects #20 gauge (and heavier) wire. When installing the harness and its accessories in your aircraft the largest current limiter in the “PTC/CB” column must not be exceeded. The current limiter always protects the wire, not the service.
- c. **High Vibration Circuits:** #22 gauge of wire is considered too fragile unless it is 19 strand Tefzel and it is in a wire bundle containing at least three other #22 wires. The SeaRey Harness uses #20 gauge wire in high vibration areas.
- d. **Service Flexibility:** The table makes reference to a number of specific services such as Rotax TCU, Dynon D-180, Skyview and D-6. The installer can choose to substitute equipment as long as power demand does not exceed the capability of the circuit. Several low amperage services can be powered by a common (current limiter protected) buss. The Table “Remarks” column suggests B1 and B2, (possibly a shared terminal strip), each protected by a 5 amp current limiter.
- e. **Avionics Buss:** The installer may choose to power avionics on separately protected circuits but from a common switched avionics buss. The table shows the services that could be powered from the avionics bus on the ACI Power Buss.
- f. **CN2 CN22 CN23:** These are ACI Power Buss sensing circuits (as installed.)
- g. **Shielded Wires:** These wires have a shield that should be grounded (normally to a ground terminal strip near the battery.) Radio and intercom grounds and shields should always be grounded at the same avionics ground buss terminal strip .
- h. **The Regulator C Terminal:** The “C” terminal on the Rotax voltage regulator uses sensed voltage (normally at the instrument panel) to regulate voltage output. The #18 gauge harness wire from the panel to the “C” terminal insures a voltage drop of less than 0. 2v. In the “Suggested Wiring with SeaRey Power Buss” diagram we directly connect the Regulator “C” terminal wire through an in-line fuse to the generator side of the 25 amp Generator Circuit Breaker.

IV. INSTALLATION

Installation of the harness begins at the nose of the aircraft and works back on both sides. The heavy #4 cables should be cable-tied to the main harness where applicable. The use of plastic loom to cover the harness in cockpit areas will improve esthetics and prevent abrasion. .

Where the harness divides, the installer should choose the most appropriate route for the specific application. The harness and each harness branch must be protected from abrasion using stand-offs as necessary. In areas of vibration or movement single wires should be looped. In all cases AC 43.13 is governing.

Harness installation aft of the main bulkhead proceeds up around the Turtle Deck arch and then up through the pylon. From that point the left and right side harness bundles proceed along the root tube as far as the engine sensors.

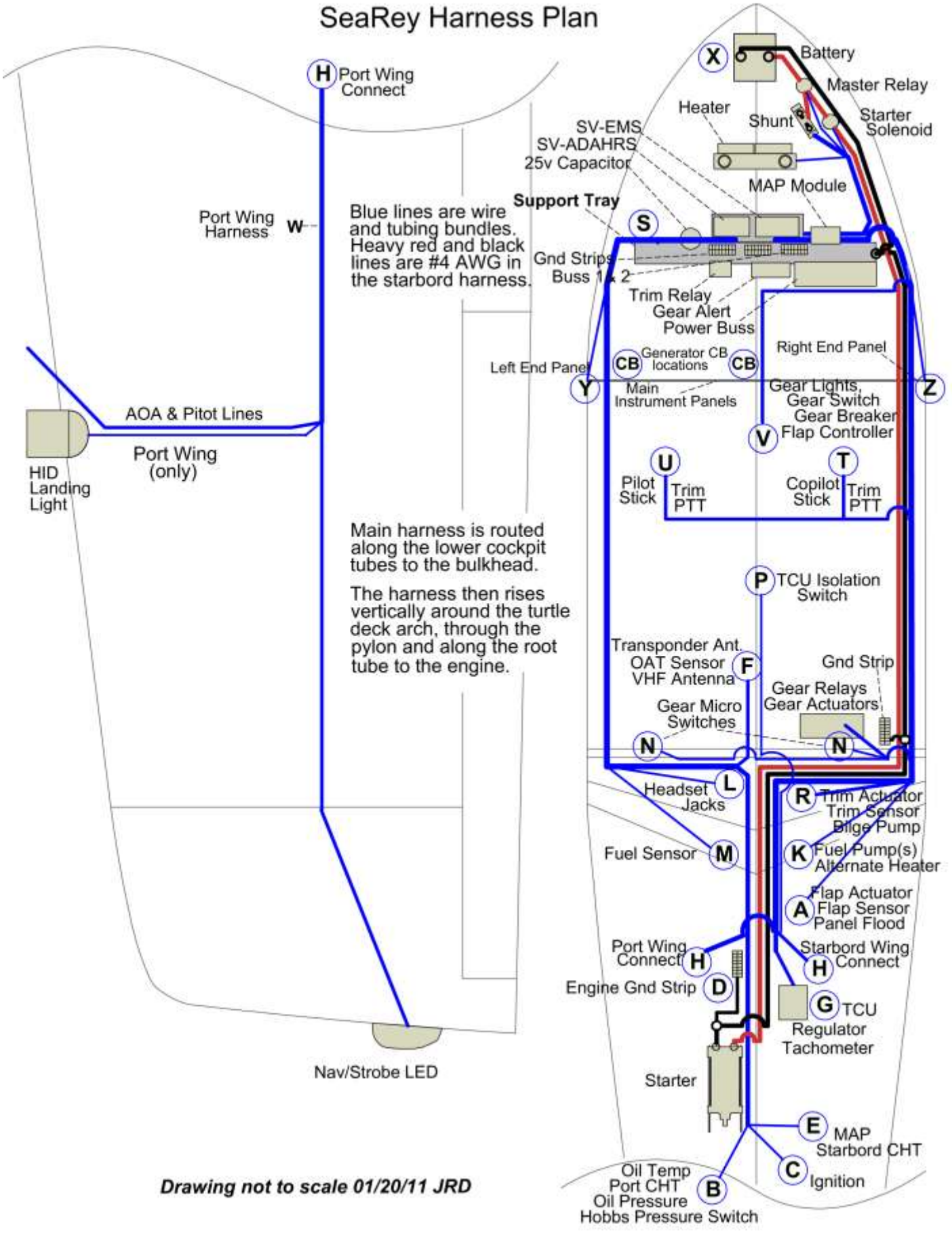
Refer to the separate Wire List Document.

- a. Note the difference between your planned service locations and the assumed service locations in the Wire List. (There is wiring also provided to the alternate heater location.)
- b. Note the differences in your services, instruments etc. from those in the Wire List.
- c. Now note any wires that can be better used for your unique installation. For example, you may not have the Electric Flap and Flap Controller options and therefore all flap wiring in areas “V” and “A” may now be redundant. However, if you have installed a micro switch on a cam at the manual flap horn to indicate a Gear Alert landing flap signal (GND), you might decide to use one of the V to A flap wires to carry the ground signal to the Gear Alert. (The harness already assumes a Flap Controller in area “V” and has a Gear Alert flap signal wire “V2” in that location.)
- d. There should be enough length in the Flap and Gear control sub-harness to move position “V” to the main instrument panels or end wings. However, such a decision may require different or additional DB connectors.
- e. Redirected wires will require relabeling at one or both ends and the changes noted in your wire list document. Changes to the instrument layout may also require panel-end relabeling of many harness wires.

The installer will have to trim the end of each service wire to length and then implement connections to services as appropriate.

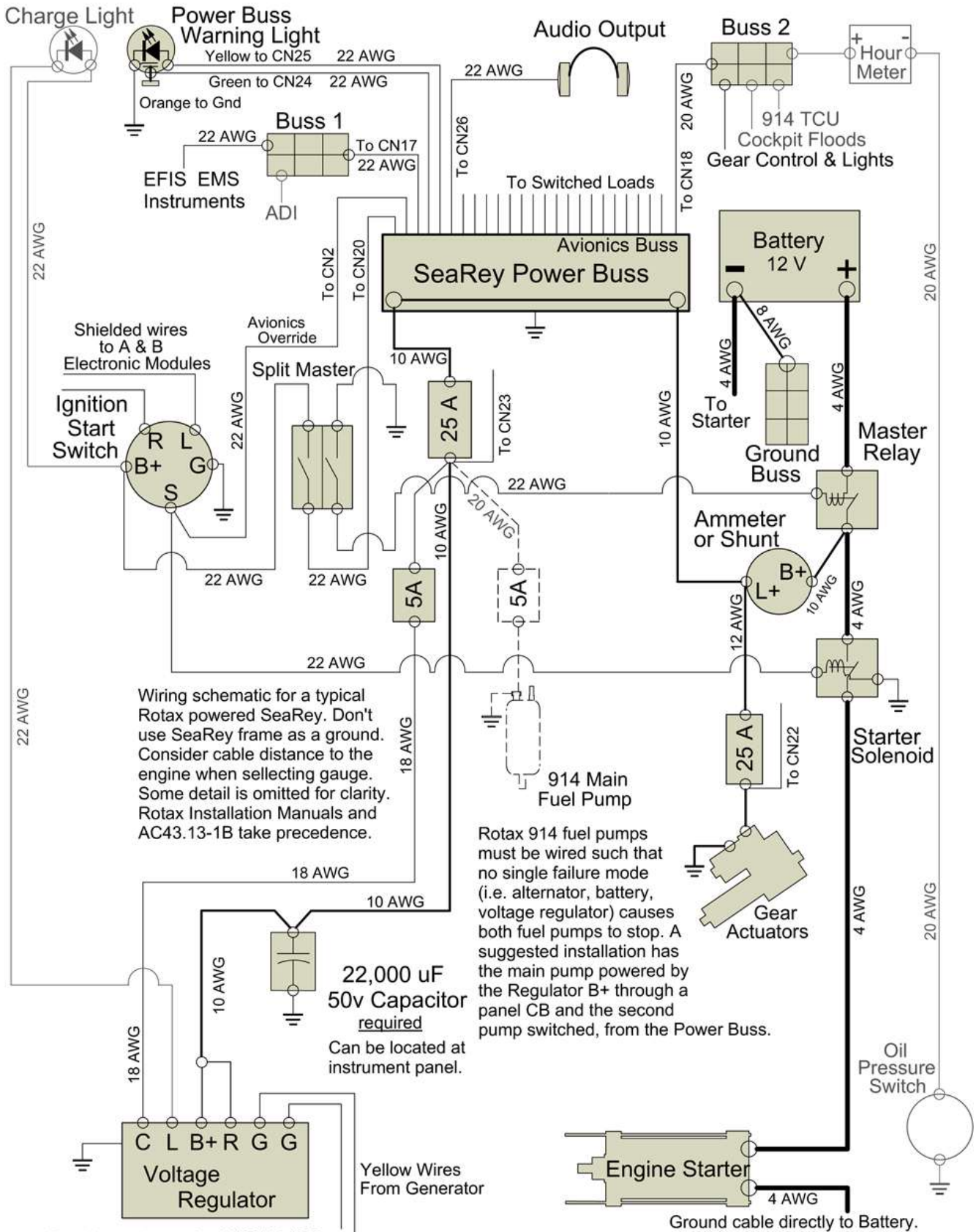
Accessing instrument panel wiring for service is an important consideration! The use of a Harness Support Tray will divide the harness ahead of the instrument panel and hold it clear of the rudder pedals. It is the installer’s decision on how and whether to provide wire loops and/or connectors between the tray and the instrument panel (or sub panels) to facilitate maintenance. As mentioned earlier, each Wire List provides a DB connector guide and the optional Harness Installation Kit includes DB multi-pin connectors to facilitate disconnecting the panel(s) from the harness, Gear Alert, Power Buss and the Support Tray itself.)

SeaRey Harness Plan

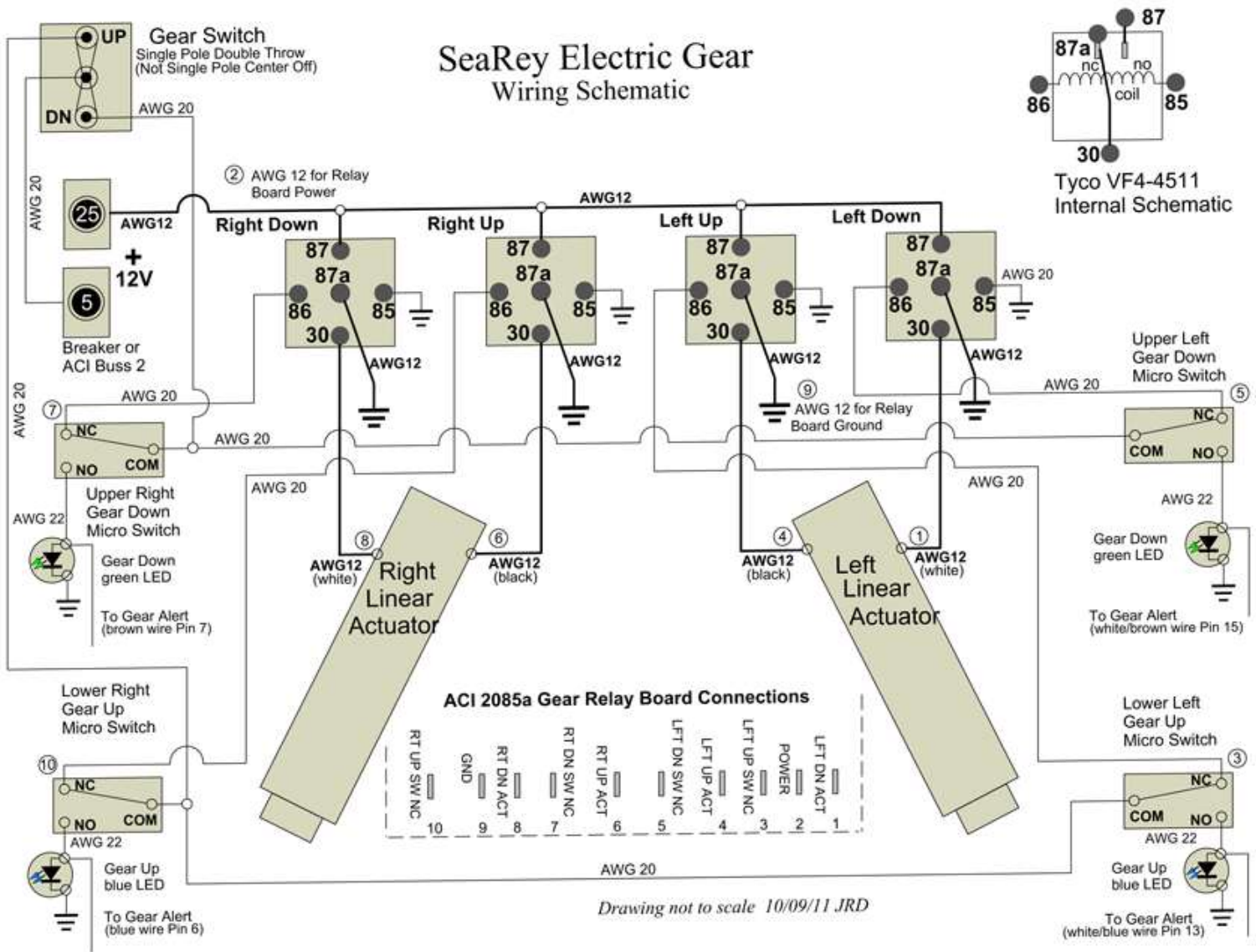


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Suggested Wiring with SeaRey Power Buss and Internal Rotax Generator



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VI. OTHER ACCESSORIES

2075A SEAREY POWER BUSS: The small Power Buss module provides overload monitoring and PTC protection for 18 electrical circuits. The Power Buss also monitors (high amperage) generator supply and landing gear actuator circuits.

Monitoring is provided by a red warning “switch-light” and an electronic voice annunciator system that warns of a tripped circuit through a small speaker and the pilot’s headset. The system also monitors system voltage and removes power from the regulator “C” terminal if generator voltage exceeds



16v. An optional feature can replace a split master switch by removing power to the regulator “C” terminal any time the master switch is turned off. During engine start the SeaRey Power Buss also automatically removes power from the sensitive avionics systems on its six-circuit avionics buss. The SeaRey Harness is pre-wired for the Power Buss. (Please also refer to the Power Buss Installation Manual.)

2070A SEAREY GEAR ALERT: The Gear Alert system becomes active after the airspeed has increased above a user-determined activation speed (60 mph). On takeoff, the system will warn if the gear is accidentally left down after the flaps are up. On approach, selecting landing flap (20 or greater) or slowing to the activation speed, initiates the landing sequence of audio and visual prompts. To silence the prompts, the pilot must push one of two panel-mounted flashing “switch-lights”, one labeled for landings on water and the other for runways. The system then provides a voice warning of an unsafe condition (wrong gear position for the intended type of landing or an asymmetric gear condition.) Otherwise, the pilot hears confirmation of the type of safe landing selected.

The SeaRey Harness is pre-wired for the SeaRey Gear Alert. (Please also refer to the Gear Alert Installation Manual.)



2071 SEAREY *e-Flaps*: The Flap Controller automatically positions SeaRey electric flaps in four selectable positions. Each position is calibrated to stop the flaps at a user-determined flap angle. Flap positions are selected by pressing switch-lights on a module that can be mounted vertically or horizontally. Flap position is indicated by the steady illumination of one of the module switch-lights (a separate flap position indicator is not required.) *e-Flaps* provides a landing flap signal to the optional 2070 SeaRey Gear Alert system thereby eliminating the need to install a separate flap position cam and micro switch. The SeaRey Harness is pre-wired for the SeaRey Gear Alert. (Please also refer to the Gear Alert Installation Manual.)

