

# Human Machine Interfaces



## Human Machine Interface Overview

For more than 50 years, Ducommun has designed and manufactured Human Machine Interface (HMI) illuminated switches, keyboards, and lighted panels for a diverse array of military and commercial applications. Platforms include the most modern military fighter and transport aircraft, commercial airplanes, helicopters, military ground vehicles, control systems, and shipboard and space applications.

Dedicated to continuous improvement and the principles of Lean Six Sigma, Ducommun has a committed team of certified personnel to facilitate the training, events and resources needed to implement measurable CI initiatives. Ducommun's quality assurance system is certified to FAA, NASA, ISO and AS9100 Rev C standards.

## Products

- Illuminated pushbuttons switches
- Annunciators
- Switch matrices
- Keyboards
- Illuminated display panels and bezels
- Time delay modules
- Caution warning assemblies
- Integrated control panel assemblies
- Rotary switch

## Illuminated Pushbutton Switches, Annunciators and Switch Matrices

As one of the largest and oldest lighted switch manufacturers in the world, Ducommun offers switch components to meet your needs. Most of our products are either FAA/PMA certified or MIL-STD/QPL certified. All of our product series offer customizable features including:

- Color (bezel, back/foreground and light)
- NVIS filtering, dimming curve
- Display etching and font size
- Number of poles
- EMI shielding
- Type of ground, contact type, and sealed/unsealed
- LED or incandescent
- Splash proof

Any switch or combination of switches can be combined in a custom matrix assembly. In addition, all models can be configured with switching functionality or simply as annunciators.

## Rotary Switches

Our universal dimmer switch and Boeing 737 engine start switch offer high reliability and flexibility in a lightweight multi-function switch.

Our unique dimmer switch designs do not use the standard potentiometer approach for dimming, thus providing a number of significant advantages:

- Supports high power in a compact and lighter package
- Efficient heat dissipation
- Significantly higher reliability than traditional potentiometer based designs

Additionally, the universal dimmer switch has the ability to work with supply voltages of 12 and 28 (AC and DC) and electrical current up to two amps at 12 volts. This voltage feature is selectable via an on-board dip switch and makes it usable in a wide variety of aircraft. In addition, the switch incorporates on/off capability by simply pulling/pushing the knob, thereby reducing the number of control devices required at each station.



Illuminated Pushbutton Switch: 10648 Mark 11

## Light Plates, Bezels, Keyboards, and Keypads

Ducommun manufactures incandescent, electroluminescent and light emitting diode (LED) illuminated display panels in all types and classes. All are precisely engineered and manufactured to exceed customer specifications. Only the best quality materials are used to ensure our products meet the highest performance standards required by the aerospace industry.

- SAE-AS7788
- Precision machined and tested
- Laser-etched for consistent readability
- NVIS compatible
- Light balanced and tested to meet all luminance
- Chromaticity, uniformity, and radiance requirements
- Type of ground, contact type, and sealed/unsealed
- Meets or exceeds all applicable military standards
- Elastomer keypad

Our light plates can be found on commercial and military aircraft, ground vehicles, helicopters, ships and spacecraft.

### Configurations

Type III thru VII

Machined acrylic, polycarbonate or aluminum

Incandescent, electroluminescent or LED

Complex curved configurations

Available in any FED-STD 595 color

Custom connectors

## Integrated Control Panels, Touch Screens and Custom Assemblies

Ducommun uses its expertise in pushbuttons, annunciators, key pads and light plates to develop custom integrated control panel assemblies. Panel assemblies incorporate a variety of components and features including:

- Custom key caps with/without annunciation
- Rockers 2/4-way switch elements (environmentally sealed)
- Annunciators (LED and incandescent)
- Sunlight readable/dead front NVIS compliant
- LED/fluorescent/electroluminescent/LCD displays
- Micro-controller control of annunciator actuation and panel/annunciator dimming utilizing PWM
- Encoders: optical/mechanical
- Diode and resistor arrays

Our complete lifecycle, engineering and 3D solid modeling capabilities combined with our wire harnessing center of excellence, allows Ducommun to develop custom control panels to meet the most complex and demanding applications.

Bus interfaces to panels using discrete, serial, and parallel data include RS232, RS422, Ethernet, and USB.

### Integrated Assemblies: Switch Options

Toggle

Rotary switch

Illuminated switches

SPDT, SOST, DPDT

Momentary contact

Custom connectors



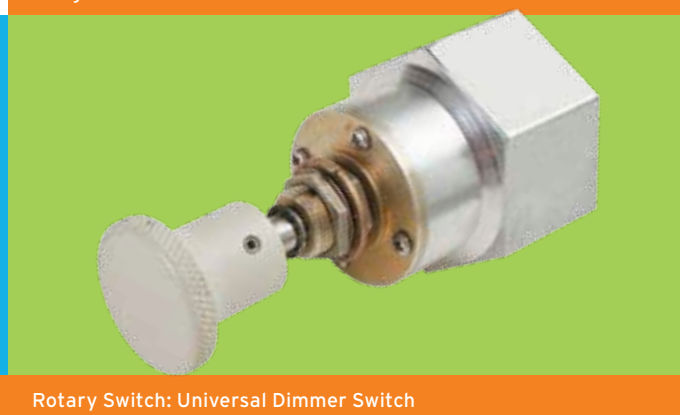
Rotary Switch: Engine Start Switch



Integrated Assemblies



Integrated Panels



Rotary Switch: Universal Dimmer Switch

## ENGINEERING AND MANUFACTURING CAPABILITIES

### Engineering

- 25 designers and engineers
- Electrical and mechanical design capabilities
- Various CAD/CAM capabilities
- Spectral radiometry
- Dedicated teams for each product line

### Testing

- Environmental
  - > Thermal
  - > Vacuum
  - > Humidity
- Corona
- High power
- RF to 50 GHz

### Assembly

- Lean environment
- Dedicated assembly cells
- Class 10,000 clean rooms with Class 100 flow benches

### Mechanical

- Sheet metal stamping and forming
- Injection molding
- Tool making center
- Laser etching
- NASA-certified soldering
- Material & component traceability
- CNC center

### Certifications

- ISO 9001 certified
- AS9100 Rev C
- MIL-PRF-22885 QPL
- FAA (ACSEP)
- FAA Repair Station (MMF)
- NASA-STD-8739.3
- MIL-L-85762A

## Where We're Located



#### BONDED COMPONENT SOLUTIONS

- Guaymas, Mexico
- Monrovia, California

#### CIRCUIT BOARD SOLUTIONS

- Appleton, Wisconsin
- Tulsa, Oklahoma

#### ELECTRONIC INTEGRATED SOLUTIONS

- Carson, California
- Huntsville, Arkansas
- Phoenix, Arizona
- Saraburi, Thailand

#### INTERCONNECT SOLUTIONS

- Berryville, Arkansas
- Joplin, Missouri

#### STRUCTURAL ASSEMBLY SOLUTIONS

- Cocksackie, New York
- Parsons, Kansas

#### STRUCTURAL SYSTEMS SOLUTIONS

- El Mirage, California
- Gardena, California
- Orange, California