CHRISTIE®

A Division of MarathonNorco Aerospace, Inc.

CASP®/ 2000

Universal, Programmable Battery Support System

Features and Benefits

- Exceptionally cost efficient
- Returns worn-out NiCds to useful service
- Features exclusive ReFLEX® charging
- Provides rapid charging
- Decreases cell imbalance
- Functions with any rechargeable battery type —even new technologies
- Operates unattended
- Automatically recognizes battery type
- Small, lightweight, and portable
- Auto ranging AC input
- A one-year Limited Warranty on parts and labor for the CASP/2000 series

Advanced Battery Support

CASP/2000 is one of the most sophisticated and versatile instrument available for reconditioning, analyzing, charging and maintaining rechargeable batteries at the peak of performance.

CASP/2000 is a state-of-the-art answer to the battery support problem.

Versatile Capability

CASP/2000 is available in two models. A 0-42 VDC / 0-14 ADC [CASP/2000L], and a 0-78 VDC / 0-10 ADC [CASP/2000H]. Both models offer a full range of battery support capabilities.

Battery Reconditioning

CASP/2000 employs Christie's exclusive ReFLEX current cycling to rejuvenate badly faded NiCd batteries. This process substantially eliminates battery memory, and

actually restores the battery to a serviceable condition, often when it will no longer hold a charge. The same process is used to maintain NiCds, and to prevent deterioration. This outstanding capability by itself justifies the use of CASP/2000.

Battery Charging

CASP/2000 charges any type of rechargeable battery. Up to six randomly intermixed batteries can be connected at the same time and charged sequentially. Charging is automatic. Each battery receives precisely the type and amount of charging it requires: ReFLEX, constant-current, two-level constant current, or constant potential. Optimized, fast charging, or slow "trickle" charging can be selected, and batteries can be discharged for storage or shipment.

Battery Recognition

CASP/2000 automatically recognizes the battery it is processing by the types of cables used for interconnection.

Battery Analysis

CASP/2000 analyzes the condition of any battery connected to the system. The battery can be analyzed in both charge and discharge modes, to determine the charge energy required and the useful ampere-hours in the battery.

Flexible Power Source

CASP/2000 can be used as a reliable power supply or "battery eliminator" with programmable voltage and current. The system is capable of providing up to 350 watts on six parallel outputs.

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SYSTEM BENEFITS

CASP/2000 performs more functions in the support of rechargeable batteries, and offers far more battery information, than any other support system on the market.

Cost Effectiveness

By virtue of its many sophisticated capabilities, CASP/2000 saves the user a considerable amount of money. Foremost is the ability to return worn-out NiCads to useful service. In addition, CASP/2000 charges batteries more quickly and more completely. With the ReFLEX method, NiCad batteries are more fully charged, stay cooler, and have less cell imbalance, thus improving their reliability and extending their life.

Advanced Processing Methods

CASP/2000 provides charging power appropriate to the charging need. This includes Christie's ReFLEX charging process, with its ability to erase memory and restore badly faded NiCad capacity.

Universal Application

CASP/2000 handles every rechargeable battery make and type—NiCad, Lead-Acid, Silver-Zinc, Nickel-Metal Hydride, or any other. The system will also accommodate new battery developments, and hence will never become obsolete.

Unattended Operation

When the desired processing function is selected, CASP/2000 sequences through each channel indefinitely, processing all connected batteries. If a fully charged battery is removed and a discharged one installed, the system will recognize the new battery and charge it appropriately. The only attendance CASP/2000 requires is the loading and off-loading of batteries.

Worldwide Operation

CASP/2000 is small, lightweight, and portable. The system accepts input power from 90 to 265 VAC, at frequencies from 47 to 440 Hz.

CONTROLS AND INDICATORS

All functions of CASP/2000 are selected and controlled from the instrument's front panel. As noted on the Controls and Indicators diagram, groups of keys have specific functions needed to operate the CASP.

LCD DISPLAY

BATTERY CABLE CONNECTION CHANNELS

DISPLAY KEYS
Specify information to be displayed on LCD, i.e. volts, amps, battery type, battery history

PROCESS KEYS
Allow selection of charge, discharge, analyze, or recondition processes

KEYPAD
Allows control of programming and channel selection

TYPICAL DISPLAYS

CASP/2000 has an integral LCD display which provides a readout for all measurements and report functions.

Press **TYPE** for battery identification

```
CHAN2: CHRISTIE U-14
4.5AH12CELL14.4V
```
Channel and battery model
Battery data

Press **CHARGE** to initiate appropriate charge cycle

```
RFX CHARGING
CHAN1   00:02:25C
```
Processing (ReFLEX);
Channel, elapsed time, and process (charge)

Press **ANALYZE/RECON** for analysis of discharge capacity and reconditioning faded NiCads

```
RFX ANALYZE
CHAN1   00:01:06D
```
Processing (ReFLEX);
Channel, elapsed time, and process (discharge)

Press **VOLTS** for voltage measurement

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CHAN2: 14.4VOLTS
CHAN3   00:01:12C
```
Channel being monitored;
Channel, elapsed time, and process (charge)

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SYSTEM OPERATION

CASP/2000 has six input/output channels to which batteries may be connected. Up to six rechargable batteries of varied types may be connected simultaneously to the system. A sequencer circuit automatically polls each connector in a predetermined sequence, providing inputs to the battery sensing circuit. This circuit identifies battery types and routes this information to the system microprocessor.

The microprocessor is the "brain" of the CASP/2000, and directs the charge, discharge, analysis, reconditioning and display functions of the system. The micorprocessor is programmed and controlled from the integral keyboard, and can adapt the system to the parameters of any rechargeable battery.

An LCD display provides a readout for the information supplied by the CASP/2000. This display can serve, for example, as a digital voltmeter, a digital ammeter, and battery identifier, a process indicator, or a programming aid. In addition, an internal speaker emits various tones for input verification, errors, and process termination. An RS-232 port on the CASP/2000 permits an optional serial printer to be connected. This printer can produce various reports, as well as graph battery charge and discharge curves. The battery discharge plot shown indicates several weak cells, and suggests that the reconditioning function of CASP should be used to balance the battery pack.

The system keyboard allows the CASP/2000 to perform its many functions simply and efficiently. For example, if the operator wishes to know the voltage of each connected battery, the "VOLTS" key can be actuated, and the instrument stepped through each successive channel. The voltage and channel information appear, clearly identified, on the LCD display. In a similar manner, each of the system's processes can be initiated and

monitored. In addition to function keys, the CASP/2000 has a alphanumeric keypad. These keys allow alphanumeric information to be entered into the system, and also allow the system to be programmed.

CASP/2000 is a highly sophisticated instrument, yet very straightforward in operation. It is by far the most advanced battery support equipment on the market today.

VOLTAGE DISCHARGE CURVE FOR 12-CELL NiCad BATTERY PACK AS PLOTTED BY EXTERNAL MATRIX PRINTER
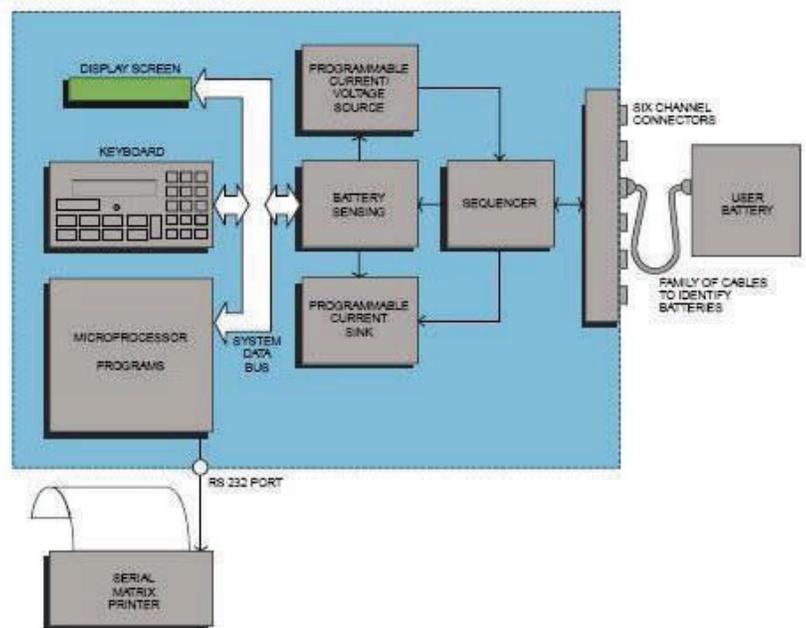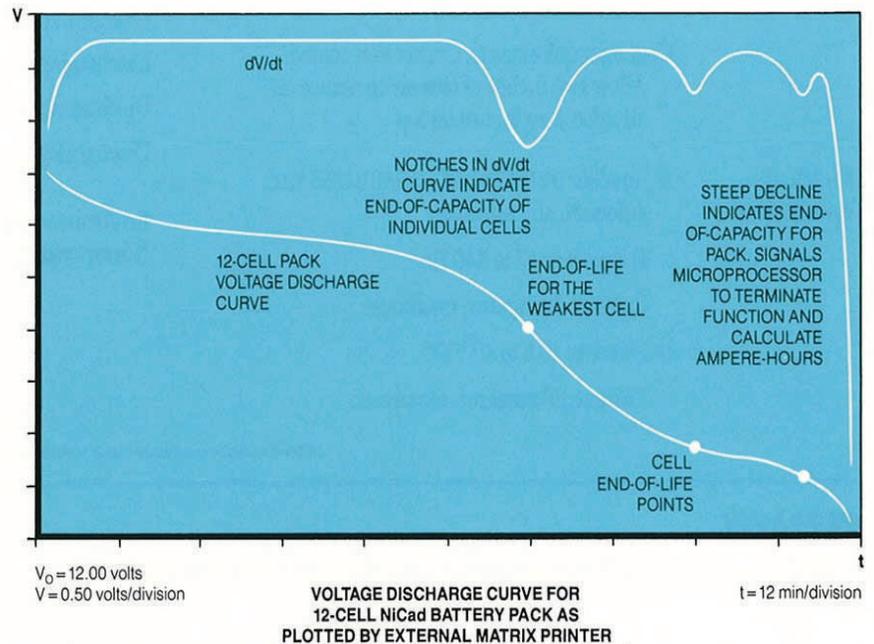
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ReFLEX CHARGING METHOD

The heart of Christie's unique CASP/2000 system is the ReFLEX charging method. With this method, sharp, negative-current, discharge pulses are alternated with positive-current charging pulses. This process prevents the formation of gases across the plate area of NiCad batteries, and restores the crystal structure of the cadmium anodes. Charging efficiency is thereby greatly improved, and the battery actually undergoes electrochemical restoration.

ReFLEX CHARGING CYCLE
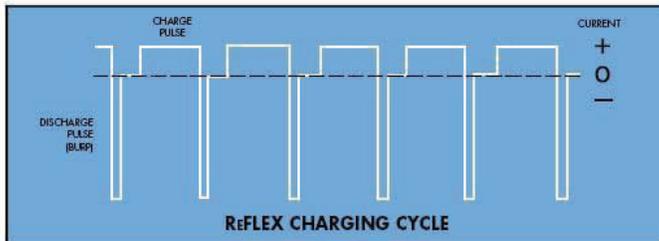
ACCESSORIES & OPTIONS

Battery Interconnect Cables
CASP/2000 is provided with six output cables, either unterminated or terminated with alligator clips at the battery end as requested by the customer.

OPTIONAL EQUIPMENT
Discharge Booster CDC-65
Can be connected to an unused channel to speed the discharge phase of battery processing.

Transport Case
Hard shell, air– and water-tight case with foam padding for CASP and accessories.

Cables
Custom output cables with special battery connectors can be supplied as an option, check with factory.

CASP/2000 SPECIFICATIONS

Mechanical

- Size (WxDxH): 8.75"x14"x4" (22.3cm x 35.56cm x 10.16cm)
- Net Weight: 14 pounds (6.36kg)
- Color: Black
- Cooling Requirements: Convection cooled. Allow two inches of free air clearance on all sides, four inches on top.

Environmental

Non-Operating
- Altitude: 0 to 40,000 feet
- Temperature: 0°C to 50°C (32°F to 122°F)
- Relative Humidity: 95% max
- Shock: 30g
- Vibration: 2g

Electrical—Input

- Voltage: 90 to 135 VAC or 180 to 265VAC, auto selected
- Frequency: 50/60 Hz
- Current: 5 amps maximum

Electrical—Output

CASP/2000L
- Charging Power: 350 W
- Charging Voltage: 0-42 VDC
- Charging Current: 0-14 ADC
- Discharging Power: 65 W max
- Discharging Voltage: 0-42 VDC
- Discharging Current: 0-14 ADC

CASP/2000H
- Charging Power: 350 W
- Charging Voltage: 0-78 VDC
- Charging Current: 0-10 ADC
- Discharging Power: 65 W max
- Discharging Voltage: 0-78 VDC
- Discharging Current: 0-14 ADC

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