

### 1.1 INTENDED USE

The Beckman SYNCHRON CX4CE and CX7 Systems (Figure 1-1) are fully automated and computer controlled instruments designed for the in vitro quantitative determination of a number of clinical chemistries in serum, plasma, urine or CSF samples. There are two system configurations available. The CX4CE provides the capability of performing 24 photometric chemistry determinations, positive sample ID, primary tube sampling and host query. The CX7 goes beyond the CX4CE to add a CX3 module for STAT sodium, potassium, chloride, CO<sub>2</sub> (through the use of ion-selective electrodes), Glucose, BUN, Calcium and Creatinine.

#### 1.1.1 Scope of This Manual

This manual covers clinical measurements as they pertain to the operation of the SYNCHRON CX Systems and makes no attempt to instruct the laboratory technologist in clinical diagnosis. Medical and diagnostic interpretation or the clinical significance of the assay results provided by the system are not discussed. Typical and actual results are shown only to demonstrate the operating procedures, parameters, and characteristics of the system.

This manual includes operating instructions for both the CX4CE and the CX7. References to CX7 include the CX4CE and the CX3. The following paragraphs briefly describe the contents of each major section of the manual:



Figure 1-1. Beckman SYNCHRON CX<sup>®</sup> 7 System

Table 1-1. Performance Specifications

<b>SAMPLING SYSTEM</b>	
Sample volume per test:	3 to 30 $\mu\text{L}$ except electrolytes; Na, K, Cl and $\text{CO}_2$ are performed on a total volume of 62 $\mu\text{L}$ .
Sample processing rate:	Sample dispensed every 16 seconds on the CX4CE and every 48 seconds on the CX3 portion of the CX7
Throughput:	CX4CE - up to 225 tests per hour CX7 - up to 825 tests per hour
<b>REAGENT DELIVERY SYSTEM</b>	
Reagent volume per test:	CX4CE - 200 to 327 $\mu\text{L}$ CX7 - 200 to 327 $\mu\text{L}$ for cartridge chemistries, 0.22 mL to 1.25 mL reagent and 6.87 mL wash solution for bulk reagents.
Reagent processing rate:	CX4CE - Reagent dispensed every 16 seconds CX7 - Reagent dispensed every 48 seconds
Onboard reagent storage:	CX4CE - 24 refrigerated (2-8°C) positions(1-24) CX7 - 24 refrigerated (2-8°C) positions (1-24) and 8 room-temperature positions on CX3 (25-32)
Onboard reagent stability:	30 days once opened (except for the following chemistries with indicated expiration dates: ALC - 7 days, ALP - 10 days, LAC, SAL - 14 days, CHE - 42 days, DIG - 16 days, TP - 20 days, CREA - 20 days, GGT - 21 days, CKMB - 5 days, Mg - 7 days and CA3, Electrolyte Buffer, $\text{CO}_2$ Acid Rgt, Electrolyte Reference — expiration date).
Cartridge volumes:	A - 110 mL, B - 18 mL, C - 4 mL
<b>PHOTOMETER SYSTEM</b> (CX4 chemistries, positions 1-24)	
Type:	Multi-wavelength, diffraction grating spectrophotometer
Light source:	Pulsed xenon lamp
Detector:	Discrete photodiodes in fixed array
Available wavelengths (in nm):	340, 380, 410, 470, 520, 560, 600, 650, 670, 700
Half bandwidth:	5 nm ( $\pm$ 2 nm)
Absorbance range:	0.0 to 1.5 A operating range 0.1% optical linearity in a 1.5 A range 0.5% electronic linearity in a 1.5 A range 0.0004 A maximum noise at 0 A
Cuvette path length:	0.5 cm

Table 1-1. Performance Specifications (Continued)

<b>CUVETTE REACTION SYSTEM</b>	
CX4 chemistries, positions 1-24)	
Operating temperatures:	30°C or 37°C (operator-selectable)
Temperature accuracy:	± 0.1°C
Temperature regulation:	± 0.1°C
<b>CX3 MODULE (CX7 only)</b>	
Measurement principle:	Ion-selective electrodes for Na, K, Cl, CO <sub>2</sub> ; colorimetry for CA3 and CRE3; conductivity for BUN3 and oxygen depletion for GLU3
Measurement time:	48 seconds (all eight tests)
Reagent type:	Na, K, Cl - Electrolyte buffer, Wash solution, Electrolyte reference  CO <sub>2</sub> - Electrolyte buffer, Wash solution, Electrolyte reference, CO <sub>2</sub> acid reagent, CO <sub>2</sub> alkaline buffer  BUN3 - Urease reagent and wash solution  CRE3 - Creatinine reagent (Alkaline Picrate)  GLU3 - Glucose oxidase and wash solution  CA3 - Calcium reagent (Arsenazo)
Reagent volume per test:	
Na, K, Cl, CO <sub>2</sub> :	0.81 mL Electrolyte buffer 6.87 mL Wash solution 1.00 mL Electrolyte reference 0.65 mL CO <sub>2</sub> acid reagent (CO <sub>2</sub> alkaline buffer recycled)
CX3 onboard reagent storage:	Room temperature
Sample size:*	144 µL (to complete all eight CX3 tests)

\* Minimum volume required for accurate level sensing is dependent upon the sample container used and the test panel. Please refer to Paragraph 11.1.2 for detailed information.

## 2.6 INSTALLATION SPECIFICATIONS

Table 2-1 lists the installation specifications for the SYNCHRON CX4CE/CX7.

Table 2-1. Installation Specifications

<b>DIMENSIONS (without system console and printer)</b>	
Instrument - CX4CE:	H 69 in ( 175 cm) D 30 in ( 77 cm) L 47 in ( 119 cm)
Instrument - CX7:	H 69 in ( 175 cm) D 30 in ( 77 cm) L 74 in ( 188 cm)
System Console Terminal:	H 13.25 in (33.7 cm) D 15.00 in (38.1 cm) L 13.50 in (34.3 cm)
Keyboard:	H 1.5 in ( 3.81 cm) D 8.25 in ( 21.0 cm) L 19.25 in ( 48.9 cm)
<b>SYSTEM WEIGHT (APPROXIMATE)</b>	CX4CE: 785 lbs (357 kg) CX7: 1135 lbs (516 kg)
<b>SYSTEM POWER REQUIREMENTS</b>	
Operating Range:	200 - 240 VAC of nominal voltage 220 VAC nominal, approximately 20 amp current rating
Frequency:	50/60 Hz
Transient Suppression:	40 db at average frequency
BTU Generated:	CX4CE: 5000 BTU/hour CX7: 7040 BTU/hour
Current:	CX4CE: 6 A nominal CX7 : 8 A nominal 70 A peak for 100 msec at power on
Connector:	20 A current rating Nema L6-20R Twistlock
Printer:	Okidata Microline 320 Printer 220 /240 VAC, 50/60 Hz

Table 2-1. Installation Specifications (Continued)

<b>SYSTEM AMBIENT OPERATING TEMPERATURE RANGES:</b>	18°C to 30°C for 37°C operation (for 50 cycle operation use)* 18°C to 30°C for 37°C operation (for 60 cycle operation use)** 18°C to 23°C for 30°C operation
Warm-up Time:	2 hours after installation
Relative Humidity:	30 - 85% noncondensing, at any temperature
<b>WATER REQUIREMENTS</b>	
Inlet Pressure:	30 psig minimum 90 psig maximum
Flow Rate:	13 liters/hour, minimum continuous flow ≤One (1) liter/minute, intermittent peak flow
Temperature:	15 - 25°C
Water Quality:	Filter to 0.2 microns absolute Specific resistivity: minimum of 1.0 megohm-cm <sup>a</sup> , 25°C Total Bacteria Count: <10 cfu/ml Dissolved Silicate: <0.1 mg/L
<b>DRAIN REQUIREMENTS***</b>	Flow rate of 15 liters/hour with drain no higher than 39 inches (99.0 cm) above the floor

\* Instruments shipped prior to February 1992 have an ambient operating temperature range of 18°C to 26°C unless retrofitted with Thermal Upgrade (P/N 756957).

\*\* Instruments shipped prior to February 1992 have an ambient operating temperature range of 18°C to 28°C unless retrofitted with Thermal Upgrade (P/N 756957).

\*\*\* If a Continental Water Modulab™ water system is used, provision must be made for its "throwaway" water requirement of approximately 100 liters per hour.