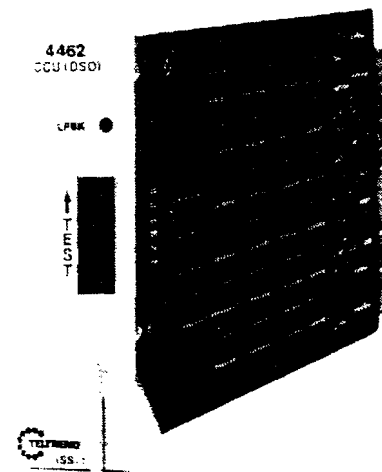


## CLEAR CHANNEL UNIT (DS0) W/SMAS LOOPBACK MODELS 4462 AND 4462A

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### 1. GENERAL

**1.01** Teltrend's Clear Channel Units (CCU) with SMAS Loopback, Models 4462 and 4462A, are D4-compatible plug-in units designed for use in AT&T's D4 and SLC\*-96 channel bank assemblies. The 4462 and 4462A units each provide a transparent interface to the channel bank common equipment for bipolar DS-0 (64kbps) signals, allowing DS-0A or DS-0B signals to be directly cross-connected between channel banks. Both units also provide a voltage-controlled loopback function that loops the bipolar signal back toward the common equipment. The loopback function is activated from the circuit's SMAS access points. These two units are identical in all respects except one: test access for the 4462 is provided by a standard Maintenance Access Connector (MAC) jack, while test access for the 4462A is provided by a pair of bantam-type test jacks. (The remainder of this document applies equally to both units unless noted otherwise.)

**1.02** This practice is being updated to provide additional application information for the 4462/A Clear Channel Unit (DS0). Whenever this practice is reissued or revised, the reason for reissue or revision will be stated in this paragraph.

**1.03** Features of Teltrend's 4462 and 4462A Clear Channel Units with SMAS loopback are as follows:

- Provides a clear channel 64kbps interface to the common equipment of D4 or SLC-96 channel banks for bipolar DS-0A and DS-0B signals

- SMAS-activated loopback provided at DS-0 (drop) ports
- Low maintenance
- No transmission conditioning required
- Easy installation
- Available with front panel Maintenance Access Connector (MAC) jack (4462) and bantam-type test jacks (4462A)
- Compatible with Digital Data System (DDS) equipment and with Basic Dedicated Digital Service (BDDS) that do not require control code loopbacks (map 0, map 1)
- Low power consumption
- 7-year warranty

**1.04** Additional features and benefits of the 4462/A include isolation of faults using SMAS loopback, continuity check from MAC to MAC during preservice tests, elimination of phase jitter accumulation, and elimination of non-linear distortion and quantizing noise.

### 2. APPLICATIONS

**2.01** The CCU with SMAS loopback is used primarily to provide an intermediate office link for analog

data circuits using T1 facilities (see Figure 1). In the Analog Data application, 4462s replace 4TO channel units in the intermediate office channel banks to provide a digital signal path through the office. This eliminates the A-to-D/D-to-A conversions performed by the 4TO units, thus reducing delay distortion in the circuit.

**2.02** The unit's standard 4-wire DS-0 interface allows it to be used in Digital Data System (DDS) DS-0 dataport applications that do not require error correction or control code loopbacks (map 0, map 1). These applications include the extension of digital data services through an intermediate office to a serving end office (see Figure 1). In the Digital Data application, the 4462 CCUs allow DS-0A or DS-0B signals to be routed from the DSX-0 cross-connect frame to a channel bank at a lower cost than conventional DS0-DP channel units. DS-0B also precludes accidental loopback and allows no error correction.

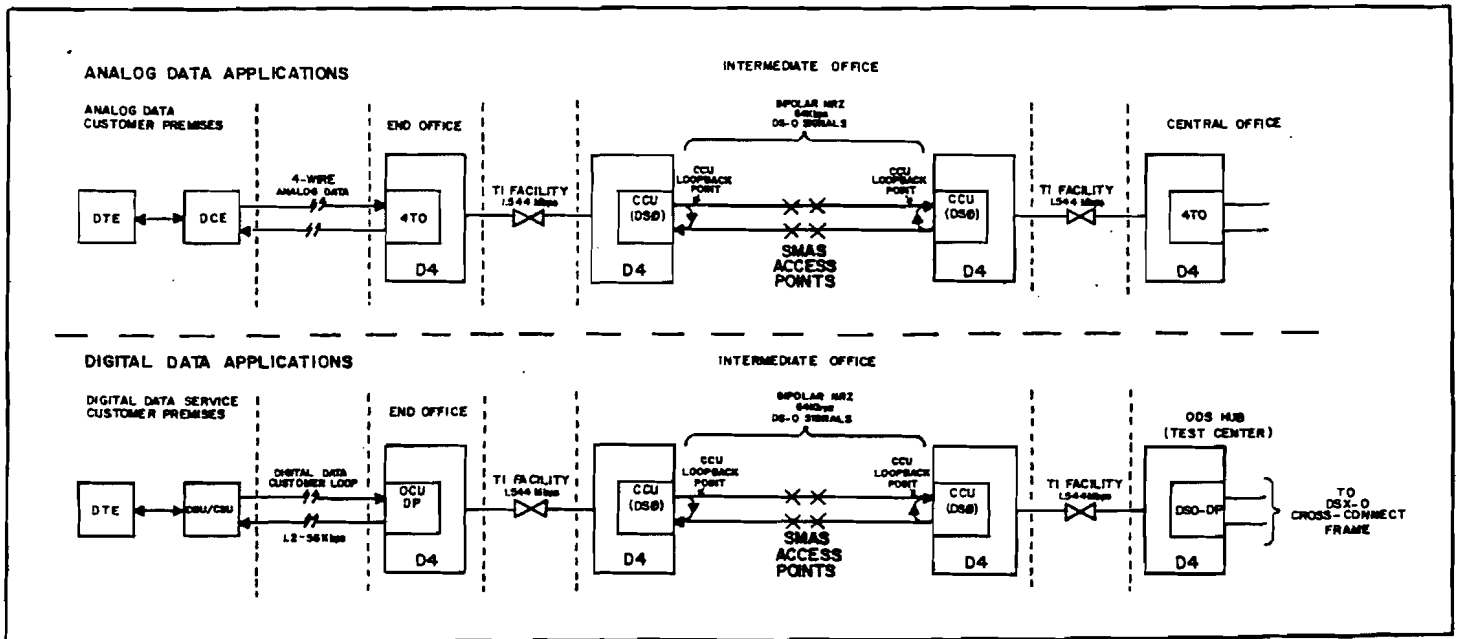
**2.03** The CCU units provide loopback at the drop-side (DS-0) interface to aid in circuit troubleshooting. The loopback function is activated from the circuit's SMAS access points by applying a dc voltage to the CCU's drop-side ports; loopback remains in effect until the voltage is removed. Other maintenance features of the CCUs include bidirectional test access via standard MAC jacks (4462) or bantam-type jacks (4462A) on the units' front panels.

**2.04** The 4462/A Clear Channel Unit (DS0) can be used in standard DDS/BDDS applications with the understanding that the unit does not provide for zero code suppression (ZCS). Note that coding restrictions A and B (TR-TSY-000157) state that the station CPE is restricted from sending eight consecutive 0's. The 4462/A does not provide control code loopbacks (map 0, map 1), but does provide SMAS loopback access in addition to the manual loopback jacks. The unit also provides a consecutive zero byte detector so that an all 1's signal is sent out to meet 1's density requirements.

**3. FUNCTIONAL DESCRIPTION**

**3.01** The 4462 and 4462A units provide an interface between a DSX-0 cross-connect frame (64kbps, bipolar, NRZ signals) and the common equipment of a D4-type channel bank. The units provide loopback of the DSX-0 signal at the drop-side ports for maintenance and troubleshooting. Please refer to Figure 2, the 4462 and 4462A Functional Block Diagram, while reading the following description.

**3.02** The transmit-side circuitry of the CCU converts bipolar DS-0 signals received from the DSX-0 cross-connect frame to the unipolar format used internally by the channel bank. The receive-side circuitry performs the reverse of these functions, converting the unipolar signals received from the common equipment to the bipolar format used at the DSX-0



**Figure 1. 4462/A Applications**

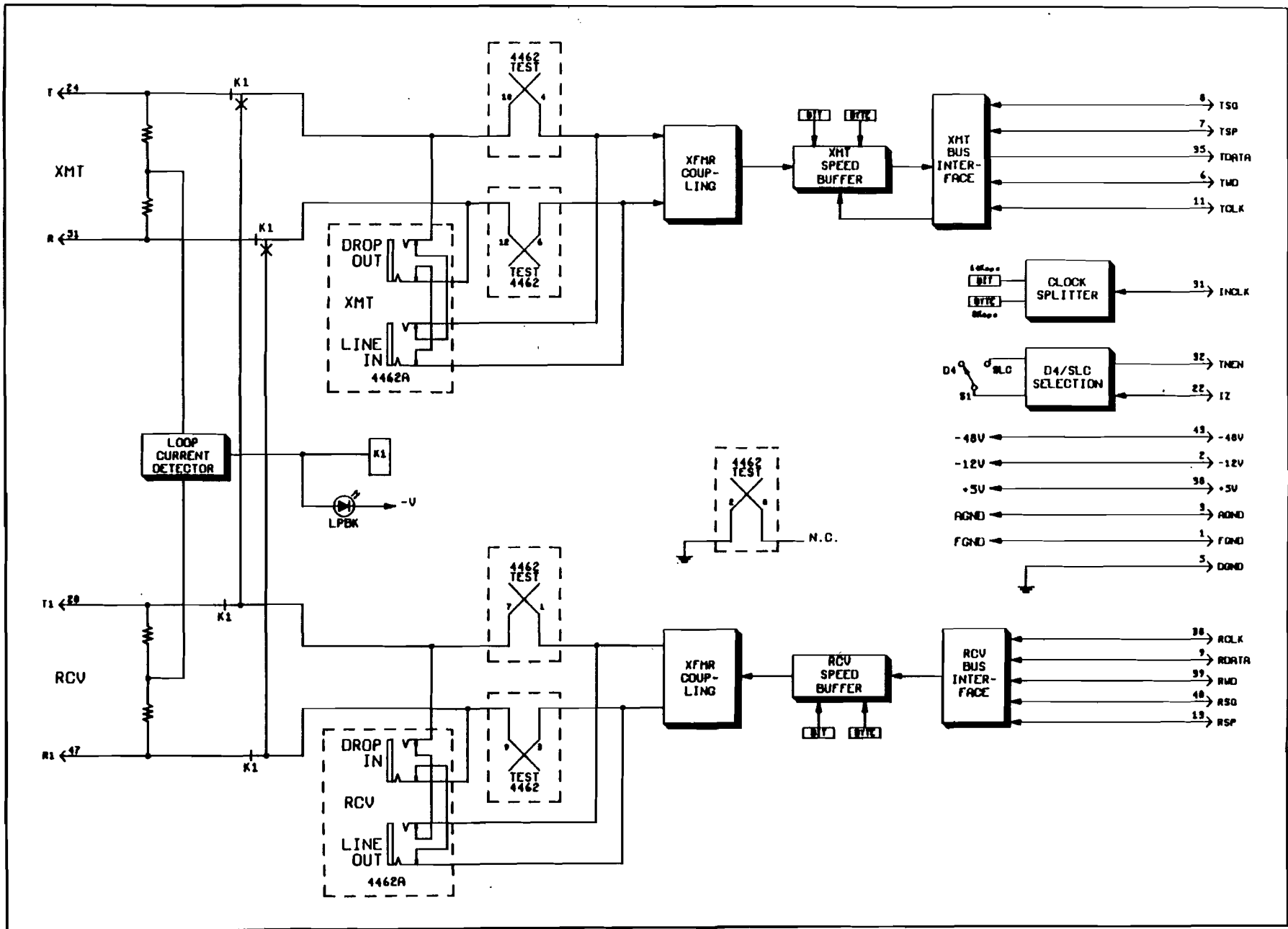


Figure 2. 4462/A CCU w/SMAS Loopback Block Diagram

frame. At the common equipment (DS-1) interface, the transmit and receive bus interface circuits decode the time slot window from the common control signals and provide access to the terminal data buses for the D4-formatted DS-0 signals at the appropriate time. The D4-formatted signals are bussed to the common equipment on the TDATA (transmit) and RDATA (receive) leads (pins 35 and 9, respectively).

**3.03** Phase synchronization between the DSX-0 signals at the drop ports and the framed D4-formatted DS-0 signals at the line ports is provided by the transmit and receive speed buffers. These 3-byte elastic storage registers compensate for any phase differences between the 1.544Mbps clock signals on the TCLK and RCLK leads and the 64kbps byte clock from the clock splitter circuit (see paragraph 3.04).

**3.04** Data network synchronization for the CCU is derived from the composite clock on the INCLK lead (pin 31). The composite clock signal consists of integrated bit (64kbps) and byte (8kbps) clock signals. The composite clock signal can be supplied from a local source for externally-timed channel banks or it can be derived from the received DS-1 bit stream for loop timed channel banks. The clock splitter circuit segregates the bit and byte components of the clock signal and routes them to the speed buffer circuits.

#### Loopback

**3.05** Loopback on the CCU is activated from the SMAS access points by applying office battery to the unit's drop-side ports. When office battery is applied, the resulting current flow is detected by the CCU's loop current detector circuit, which activates the loopback relay, K1. The loop current detector activates loopback regardless of the polarity of the voltage applied across the unit's drop ports. The loopback relay connects the CCU's receive output port (T1 and R1) to the transmit input port (T and R), thus looping the DS-0 signals received from the common equipment back towards the T1 facility. Loopback remains active until office battery is removed from the CCU's drop ports.

## 4. OPTIONS

**4.01** The 4462 and 4462A units each contain a single option switch that conditions them for operation in either a D4-type channel bank or in a SLC-96 terminal. This option should be set before the unit is installed. Figure 3 shows the location of the option switch.

## 5. INSTALLATION

**5.01** Upon receipt of the equipment, visually inspect it for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to Teitrend.

#### CAUTION

This product incorporates static sensitive components. Proper electrostatic discharge procedures must be followed.

#### Installer Connections

**5.02** Installer connections to the drop-side (DSX-0) ports of the 4462 and 4462A units are made via the connectorized cables on the AT&T D4 or SLC-96 channel bank assembly. Connections to the connectorized cables are made at the distribution frame using the appropriate T&R and T1&R1 cable pairs for the unit's mounting position. All other connections required by the CCU, including power, are integral to the channel bank assembly. The pinouts of the 4462 units are shown in Table 1.

Table 1. Installer Connections

LEAD DESIGNATION	PIN
T - Tip (XMT IN from DSX-0)	24
R - Ring	51
T1 - Tip 1 (RCV OUT to DSX-0)	20
R1 - Ring 1	47
TDATA (XMT OUT)	35
TCLK (XMT clock)	11
RDATA (RCV IN)	9
RCLK (RCV clock)	38
RNDIS (RCV disable [MUX-OUT-OF-SYNC])	14
INCLK (composite data clock)	31
TNEN	32
IZ	22
TWD	6
TSP	7
TSQ	8
RWD	39
RSP	13
RSQ	40
-48V	43
-12V	2
+5V	30
DGND	5
AGND POWER	3
FGND	1
BATT GND	15

## 6. TESTING

**6.01** Initial testing of the 4462 units consists of performing the standard test procedures for DDS dataport channel units using the KS-20908 and

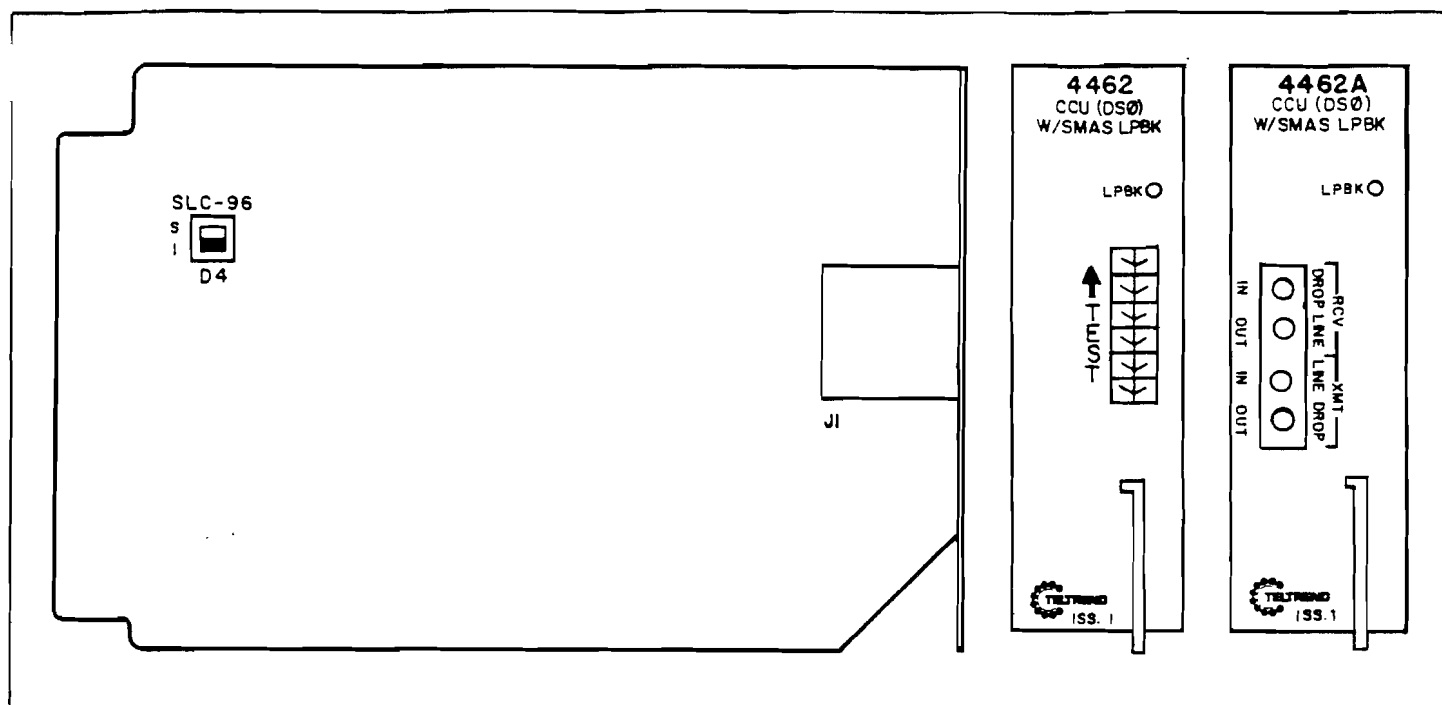


Figure 3. 4462/A Option Diagram

S-20909, or equivalent, receiver and transmitter data test sets in the bipolar mode with the exception of map 0, map 1 loopback codes. In addition, a SMAS loopback test is recommended. These procedures are intended only to ascertain proper operation of the unit and to isolate problems to the most probable area. These procedures are not designed to effect repairs or modifications. Tests or repairs beyond replacing a faulty unit are not recommended and may void the warranty.

**6.02** If technical assistance is required, contact Teltrend's Customer Service Department by calling (312) 377-1700.

**6.03** If a unit is in need of repair, call Teltrend for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid along with a brief description of the problem, to:

Teltrend, Inc.  
620 Stetson Ave.  
St. Charles, Illinois 60174  
ATTN: Repair & Return Dept.

**6.04** As specified in our warranty, Teltrend will repair and return the unit at no charge to the customer providing the warranty date stamped on the unit has not expired. If an out-of-service situation

exists, a replacement unit can be obtained; however, a purchase order number will be required to ensure return of the defective unit.

## 7. SPECIFICATIONS

**Network Interface:** 64kbps DS-0

**Service Rates:** 64kbps DS-0A and DS-0B

**Duty Cycle Conversion:** Bipolar Non-Return-to-Zero (NRZ) to unipolar NRZ

**Rate Matching:** 64kbps DSX-0

**Timing:** Derived from DDS composite clock (64kbps bit and 8kbps byte) or OIU2 D4 common control card (J98726AL-2 L2)

**Pulse Amplitude:** Between 3.0 and 5.5Vp for transmitted logic 1

**Facility Impedance:** 135 ohms @ 64kbps

### OPERATING ENVIRONMENT

**Temperature:** 32° to 122°F (0° to 50°C)

**Humidity:** 0 to 95%, no condensation

**Power:** -48, -12, and +5 Volt dc

**Power Consumption:** 0.3 watts, nominal

**Dimensions:** Height, 4.44 in. (10.56cm); width, 1.3 in. (3.12cm); depth, 9.89 in. (23.74cm)

71-4462/A-00

**Weight:** 6 oz (170.1g)

**Mounting:** Mounts in one position of an AT&T D4, SLC-96, or equivalent Channel Bank Assembly

**ORDERING INFORMATION**

Order in accordance with the following:

4462 CCU - Clear Channel Unit (DS0) w/SMAS Loopback and  
MAC Jack

CLEI\* Code: D4DAF3C6AA

4462A CCU - Clear Channel Unit (DS0) w/SMAS Loopback and  
Bantam Jacks

CLEI\* Code: D4DAF4C6AA

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