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TM 88-ICS-8049-10

TECHNICAL MANUAL

OPERATION AND MAINTENANCE

COMMUNICATIONS INTELLIGENCE SIMULATOR

MODEL/AAP#: ICS-8049

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Chapter 1: System Description & Operating Principles

Section I: General Overview

The **ISN Communications Intelligence Simulator (Model ICS-8049)** is an integrated tactical electronic warfare training platform designed to instruct radio operators, analysts, and intercept technicians in COMINT collection, Signal Analysis, and Electronic Countermeasures (ECM) mitigation. This simulator reproduces dense-signal tactical environments utilizing standardized analog audio-cassette transports.

The simulator is housed in a heavy-duty, aluminum reinforced transit case configured with dual mechanical latches and transport handles. It is split into two primary operational assemblies:

- **The Signal Generation Assembly (Base Unit):** Serves as the signal generator, mixing, amplifying, and modulating up to ten discrete communications targets alongside a master electronic jamming sweep.
- **The Dual Operator Intercept Console (Lid Unit):** Provides two fully independent intercept stations mimicking modern tactical direction-finding and telemetry receivers.

Section II: Principles of Operation

The physical operation of the ICS-8049 relies on direct analog tape-to-bus routing integrated with computerized digital telemetry synchronization. The signal path and system logic flow according to the following operational parameters:

1. Target Signal Synthesis & Mixing

Ten discrete tape decks represent tactical transmission targets (such as VHF/HF radio nets). Each channel outputs an analog signal routed through a dual-channel pre-amplifier. A dual-slider control on each deck allows fine-tuning of signal levels and left-to-right panning configurations. These target signals are combined onto an internal operational bus.

2. Electronic Countermeasure (Jamming) Injection

A dedicated central **Jammer** tape transport generates simulated jamming waveforms (e.g., white noise, swept carrier, or spark-gap interference). Under instructor control, this jamming signal is directed to any combination of the 10 target channels via the **Jamming Selector** toggle switches. The intensity of the interference is modulated via the **Jamming Gain** controller, allowing instructors to simulate variable distances from hostile electronic warfare units.

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3. Digital Telemetry and LOB Synchronization

To simulate Direction Finding (DF), the device incorporates a digital telemetry subsystem. Red LED arrays on both panels display **Time**, **Frequency (FREQ)**, and **Line-of-Bearing (LOB)**. During cassette playback, a sub-audible control carrier recorded on the tapes or internal microprocessors update these displays in real-time. Operators use the LOB coordinates (000 to 359 degrees) to perform triangulation exercises.

CAUTION: Power Grid Safety

Prior to connecting power, verify that the 115V/230V Selector Switch matches local utility standards. Applying inappropriate voltage will breach the F1 fuse and risk critical damage to internal transformer windings.

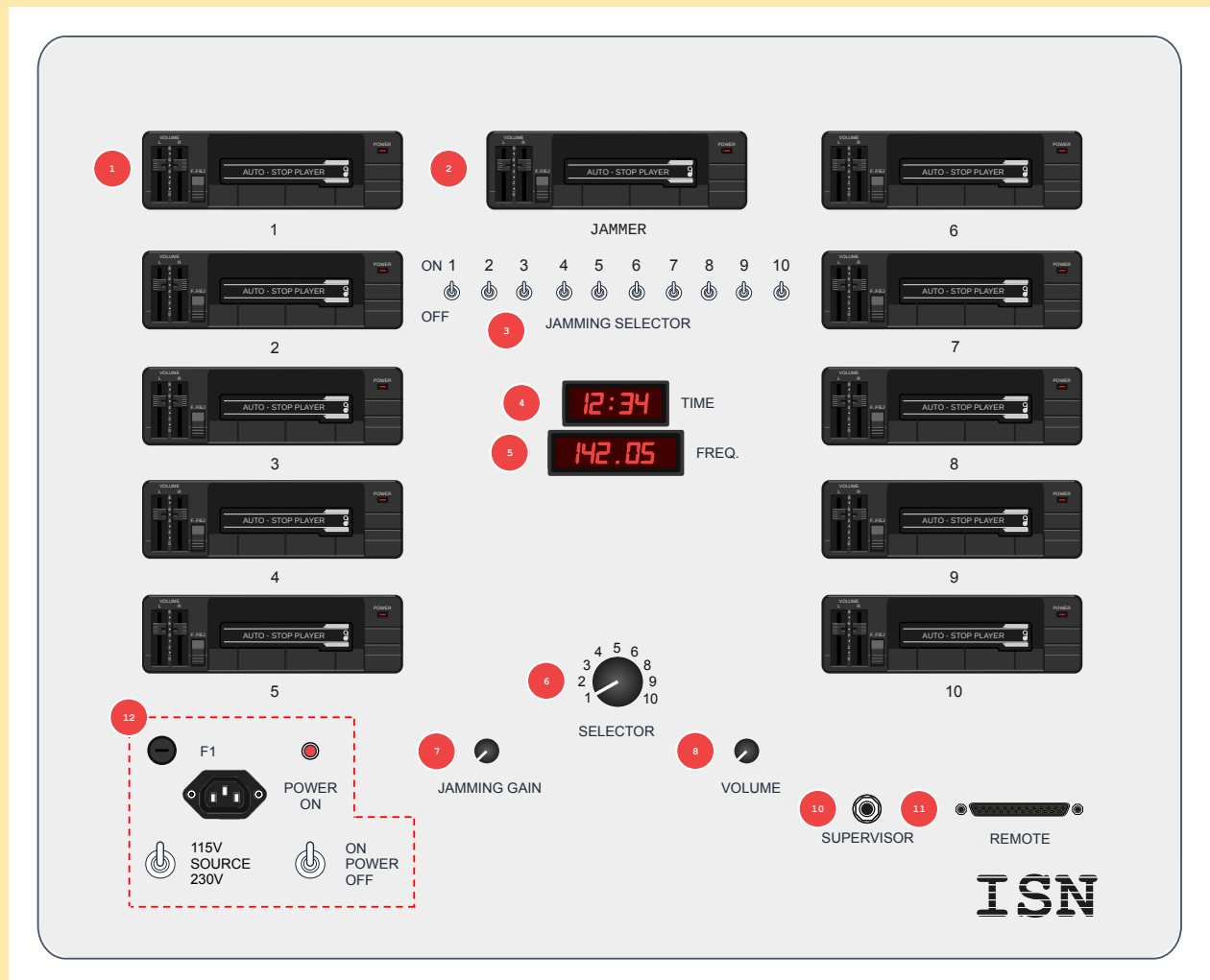
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Chapter 2: Control Panels & Visual Legend

Section I: Base Panel (Signal Generation Assembly)

The Base Panel acts as the master signal workstation, typically operated by an instructor, evaluator, or supervisor to configure training environments.

Figure 1: Signal Generation Assembly (Base Unit) Control Layout



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ID	Control / Interface Name	Functional Description
1	Target Cassette Decks (1-10)	Individual playbacks representing specific target tactical transmitters. Outputs variable audio level.
2	Jammer Cassette Deck	Generates synthesized ECM / jamming noise files. Shared across all channels.
3	Jamming Selector Toggles	Two-position toggle arrays linking the central Jammer output to individual target tracks (1 through 10).
4	Master Time LED Display	Represents the simulated scenario elapsed coordinate clock.
5	Master Frequency LED Display	Indicates the operational frequency of the target selected via the Selector dial.
6	Master Selector Knob	Routes telemetry and audio of selected channel to the master diagnostic bus.
7	Jamming Gain Dial	Modulates amplitude of jamming noise injected into active target streams.
8	Master Volume Dial	Controls instructor signal monitoring output to headphone jacks.
9	Base Headphone Jack	Instructor audio output (1/4" TRS socket).
10	Base Supervisor Jack	Direct interface jack matching student operator outputs.
11	Base Remote DB-25 Connector	Provides power and signal exchange between consoles.
12	Power Console Group	Houses the F1 fuse, AC voltage selection, master power toggle and power indicator.

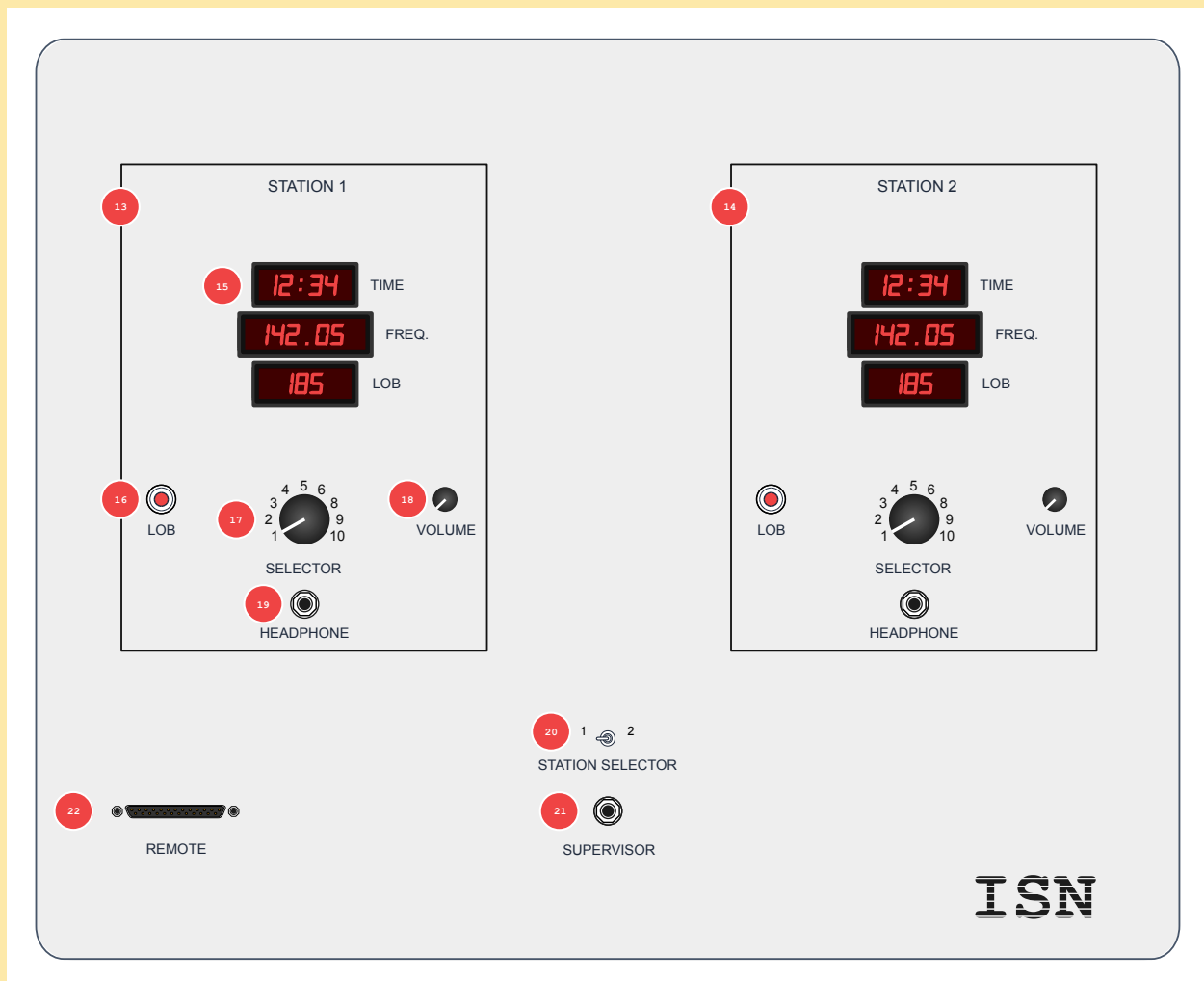
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Chapter 2: Control Panels (Continued)

Section II: Lid Panel (Dual Operator Intercept Console)

The Lid Panel contains the training interface, housing Station 1 and Station 2. This assembly allows two student operators to work concurrently under different scenario parameters.

Figure 2: Dual Operator Intercept Console (Lid Unit) Control Layout



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ID	Control / Interface Name	Functional Description
13	Station 1 Sub-Panel	Primary student operator workstation console. Fully self-contained.
14	Station 2 Sub-Panel	Secondary student operator workstation console. Runs on identical loop.
15	Receiver Metric LEDs	Three dedicated display registers outlining tactical metrics: Time, Target Frequency (MHz), and Line of Bearing (Degrees).
16	LOB Pushbutton	Function: A momentary mechanical switch utilized by the student operator to capture, lock, or transmit the current real-time Line-of-Bearing telemetry data to the system bus or data log during direction-finding and triangulation exercises.
17	Station Selector Knob	8-position rotary dial to toggle receiver scan frequency presets.
18	Station Volume Knob	Local gain adjustment for student operator headphone output.
19	Station Headphone Jack	Standard 1/4" TRS headphone connection.
20	Station Selector Toggle	Switches central supervisor monitoring input between Station 1 and Station 2 outputs.
21	Supervisor Jack (Lid)	Primary monitoring interface for instructor auditing of active student station operations.
22	Lid Remote DB-25 Connector	Provides power and signal exchange between consoles.

Chapter 3: Operating Procedures

Section I: Pre-Operational Inspections & System Setup

Perform the following steps prior to initializing any electronic training scenarios:

1. Verify the transit case is resting on a level surface. Secure the lid latches and open the case to expose both the base and lid panels.
2. Inspect the internal cabling. Ensure the multi-pin interface jumper is connected between the Base Remote [11] and Lid Remote [22] interface blocks.
3. Verify the F1 [12] fuse cap is secure. Adjust the voltage select switch to match your local mains (115V or 230V).
4. Ensure all cassette compartments are clean of debris, tape oxides, and dust.

Section II: Standard Initialization Flow

WARNING: Hearing Safety

Confirm all volume knobs (Base [8], Stations [18]) are rotated fully counter-clockwise (zero-gain) before wearing headphones. High audio spikes can occur when initializing magnetic tape heads.

1. Insert the target scenario tapes into the **Target Cassette Decks (1-10)** [1]. Ensure tape formulations match standard Type I Normal Bias parameters.
2. Insert the jamming signal cassette tape (white noise, sweep noise, or impulse crackle) into the central **Jammer Cassette Deck** [2].
3. Connect primary power using the supplied IEC cord to the **Power Console** [12]. Flip the power switch to the **ON** position. The LED display windows should illuminate with starting clock and baseline telemetry metrics.
4. Press **PLAY** on all active Target decks and the Jammer deck. Adjust the dual sliders on each deck to moderate levels.

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Section III: Training Exercises & Electronic Counter-Countermeasures (ECCM)

The simulator is intended to train students in signal discrimination under hostile jamming. A standard exercise executes as follows:

Exercise 1: Signal Intercept and Line-of-Bearing Logging

1. Student operators connect headphones to **Station Headphone [19]**.
2. The student uses the rotary **Selector Dial [17]** to scan through channels. As the selector matches an active target channel, the corresponding audio becomes audible, and the digital display blocks (**Time, Freq, LOB [15]**) show target telemetry.
3. The student logs the target's operating frequency and the Line of Bearing (LOB) coordinates. When a stable signal lock is maintained, the red **LOB LED [16]** illuminates, confirming direction-finding lock.

Exercise 2: Identifying Jammed Channels

1. The instructor acts on the Base Panel, utilizing the **Jamming Selector Toggles [3]** to inject ECM into target lines.
2. The instructor adjusts the **Jamming Gain [7]** to vary the strength of the interference.
3. The student operator must identify the compromised channel, try to filter out the noise using regional volume parameters, or switch to backup channels in the target net.

Section IV: Maintenance & Fuse Replacement

Minimal maintenance is required to keep the ICS-8049 operational. Periodically execute the following preventive operations:

- **Magnetic Head Care:** Clean tape playheads and capstans every 50 hours of operation using 99% anhydrous isopropyl alcohol and fine cotton swabs.
- **Fuse Replacement:** If displays fail to light up when connected to power, switch power off and unplug the cord. Unscrew the F1 fuseholder cap. Replace with a 2A 250V fast-acting glass cylinder fuse.