

# SpectraMind V50 - Operator Flight Card

## LOCAL MODE

```
# Install dependencies & activate environment
poetry install --no-root && poetry shell
nvidia-smi

# Self-test pipeline
python -m spectramind selftest

# Training phases
python -m spectramind train phase=mae
python -m spectramind train phase=contrastive
python -m spectramind train phase=supervised

# Calibration & diagnostics
python -m spectramind calibrate-temp
python -m spectramind calibrate-core1
python -m spectramind diagnose dashboard

# Predict & submit
python -m spectramind predict --out-csv outputs/submission.csv
python -m spectramind submit bundle
```

## KAGGLE MODE

```
# Predict for Kaggle submission
python -m spectramind predict data=kaggle      --out-csv /kaggle/working/submission.csv

# Useful flags
data=kaggle      # Hydra config for Kaggle mounts
--fast           # Faster, lower-precision inference
--resume         # Resume from cached checkpoints
```

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## OPERATOR DOCTRINE

- FGS1-First Strategy - prioritize Fine Guidance System channel (~58x AIRS bin weight).
- Physics Guardrails - enforce smoothness, non-negativity, molecular coherence, CH<sub>4</sub>:H<sub>2</sub>O:CO<sub>2</sub> envelopes, quantile monotonicity.
- Calibration Kill-Chain - ADC reversal -> bad-pixel masking -> non-linearity -> dark subtraction -> flat-fielding -> trace extraction; never clip negatives.
- Reproducibility Stack - log git SHA, Hydra config hash, environment details to v50\_debug\_log.md & events.jsonl on every run.
- Runtime Discipline - <= 9h hard wall (~30s/planet); telemetry enforcement with Kaggle overrides.
- Diagnostics by Default - SHAP x symbolic overlays, UMAP/t-SNE, FFT/smoothness, per-rule violation logs, versioned HTML dashboard bundle.