

Quality Assurance Training and Certification Program

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Quality Assurance DSN and Mechanical Hardware Section

The JPL Quality Assurance Training and Certification Program provides courses by qualified and certified instructors in the proper techniques of hand soldering, cabling and harnessing, wire wrap, cable repair, and printed conductor module repair.

I. Introduction

The JPL Quality Assurance Training and Certification Center specializes in technical training courses related to the fabrication of electronic equipment (see Table 1). These courses conform to released standards and specifications.

Good workmanship and quality are the key to dependability. The best of standards and specifications must be supplemented with personnel trained in the proper techniques of good workmanship. This quality assurance program provides the mechanics for improving personnel capabilities, and thus ensures a higher level of quality and reliability.

II. NASA Audit

During September of 1974 NASA auditors conducted a survey and audit of the JPL Quality Assurance DSN and Mechanical Hardware Section and issued a commendation

for operating a training school that services JPL on-sites, the global DSN, contractors, suppliers and Government agencies. They requested that JPL video tapes and other training materials be provided to other NASA centers upon request.

III. Scheduling of Classes

An advance schedule of training courses and events is published each month. Due to heavy work load, advance notification for registration is required. New courses are added to the training program as required to fulfill the needs of new technology.

IV. Training Equipment

The Quality Assurance Training and Certification Center provides the latest state of the art in work stations and electronic assembly equipment as shown in Figs. 1 through 7, and 9 and 10.

V. Certification

A certificate of completion is issued to each successful student and is valid for one year, at which time the student must requalify for proficiency in the specific techniques.

VI. DSS Stations, Overseas Training Program

JPL Quality Assurance provides assistance to Training Instructors at the Deep Space Stations located in Spain and Australia. These instructors are trained and certified by JPL Quality Assurance and are qualified to teach the same courses that are taught at the JPL facilities. The training programs at the overseas stations have been highly successful and this arrangement provides a continuity of consistent workmanship to established standards throughout the Network.

VII. Support to Technical Personnel

Quality Assurance personnel provide assistance to technical personnel when design problems exist. This includes areas where wire wrapping of component leads is necessary in congested areas of integrated circuit chassis, splicing techniques in restricted areas, pull tests for various types of crimping assemblies, and, in some cases, the restoration of damaged circuit boards to operational status. Technical bulletins provide other informational support on various types of coaxial assemblies now in use throughout the Deep Space Network.

VIII. Benefits to NASA/JPL

Since the inception of the Training and Certification Program in 1964, the JPL Training and Certification

Center has trained and certified in excess of 2000 students in technical courses (see Fig. 8). Results of this effort have proven conclusively that properly trained personnel have a large influence in the reduction of costs by the prevention of discrepant material.

For example, previously, in the area of cable repair, multiconductor cables were manufactured, tested, inspected, and shipped to our overseas stations. If one became damaged, it had to be replaced with a spare, returned to JPL for repair or replacement, and again shipped to the overseas station at additional cost. Since the advent of the cable repair course, a cable can now be repaired on site by qualified JPL-trained station personnel with the JPL-furnished cable repair kit for an average cost of four manhours and \$20.00 worth of material. A set of video training cassettes for cable repair is presently at each Deep Space Station for station use. Similar examples exist in the areas of wire wrapping, soldering, harnessing, and cabling.

IX. Summary

The Quality Assurance Training and Certification Program is utilized by NASA and the Department of Defense (DOD). The training is available to JPL personnel, contractor personnel who have current contracts with NASA/JPL, and Government personnel. Many NASA and DOD personnel have attended and were certified at JPL. Consistent good workmanship programs result from established standards that effectively reduce rework through proper training. Training is provided by qualified instructors with lesson plans and audio and video aids such as TV cameras, monitors, and cassettes for concurrent classroom presentations.

Table 1. Training Courses offered by JPL Quality Assurance Training and Certification Center

Course	Course code	Hours
Group I: DSN/OSE^a Type		
a. Hand Soldering	A	40
b. Cabling and Harnessing	B	40
c. DSS Electronics and Fabrication (DSS Stations)	C	40
d. Wire Wrap	D	16
e. Cable Repair (DSS Stations)	E	16
f. Printed Conductor Module Repair	I	24
Group II: Flight Type		
a. Flight Cable Fabrication	G	40
Group III: Packaging, Packing/Shipping, Receiving		
a. Preservation and Packaging	H	40
Group IV: Quality Assurance		
a. Quality Assurance Inspection Techniques		40
Group V: Familiarization and Indoctrination (Supervisor Application)		
a. Wire Wrap	D	4
b. Hand Soldering	A	16
c. Cabling/Harnessing	B	16
d. Cable Repair	E	4
e. True Positioning Tolerancing	J	4
f. Printed Conductor Module Repair	I	8
^a Operational support equipment.		

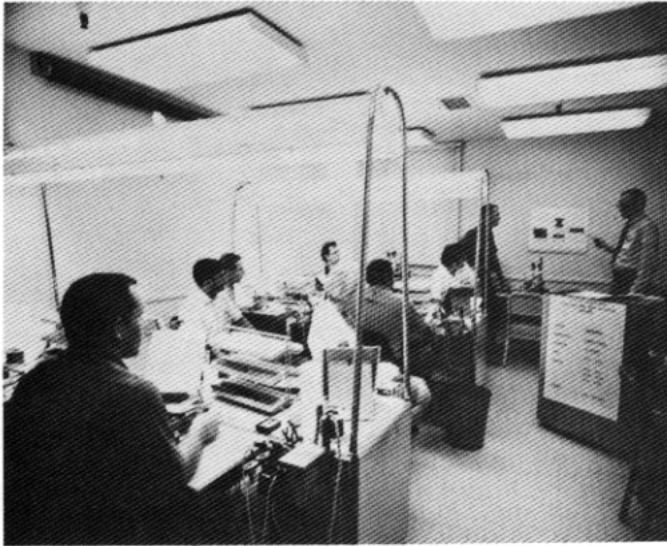


Fig. 1. Instructions are given to the students by qualified and certified instructors

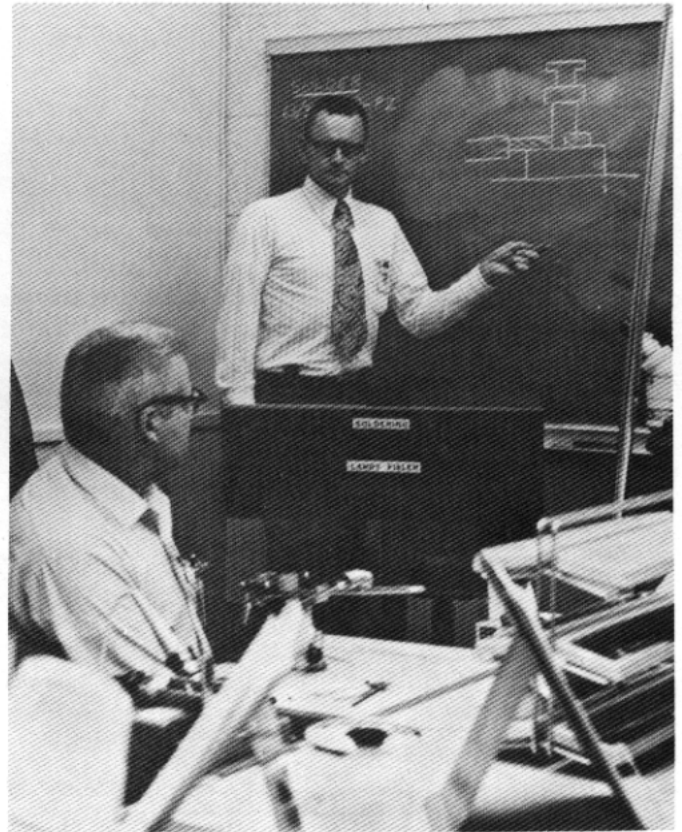


Fig. 3. Instructors provide illustrations for training technique



Fig. 2. Demonstrations are important as a follow-up to the material previously presented

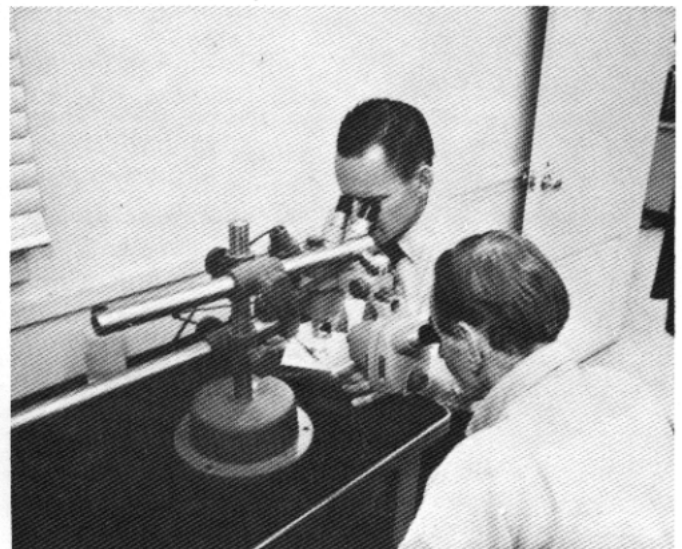


Fig. 4. Work accomplished by the student is inspected by the instructor and observed by the student using the dual microscopic inspection setup

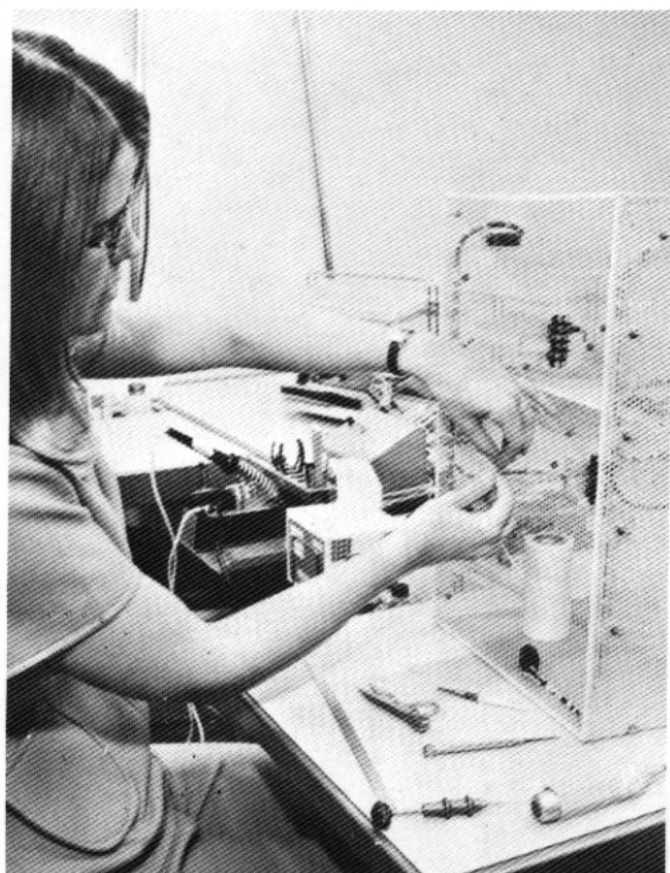


Fig. 5. Chassis cabling/wiring assembly

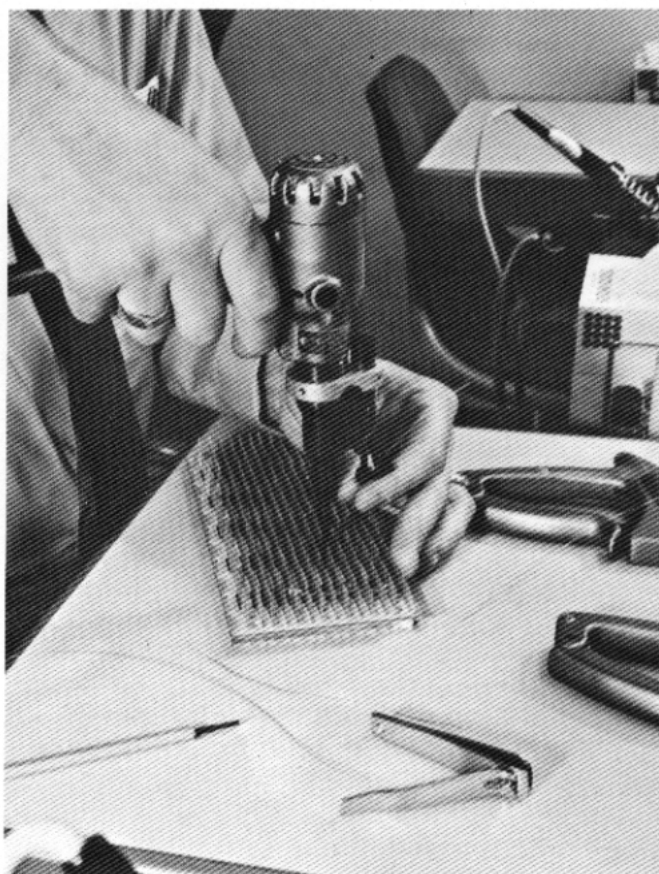


Fig. 6. Wire wrap assembly

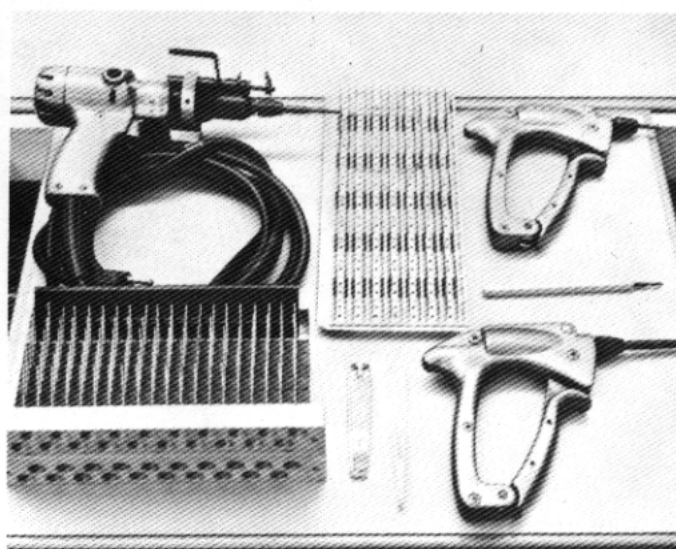


Fig. 7. Solderless (wire wrap) equipment

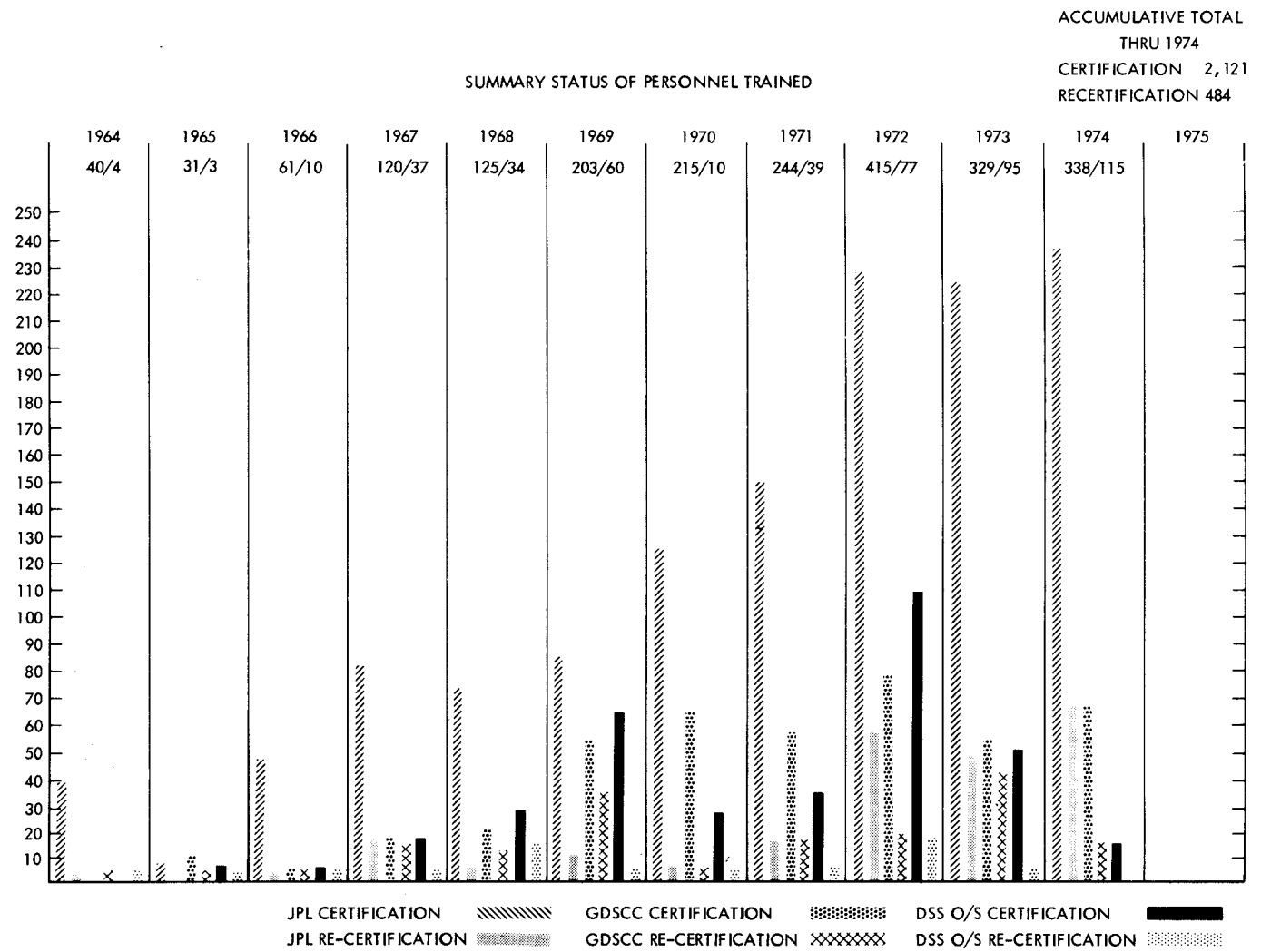


Fig. 8. Summary status of personnel trained

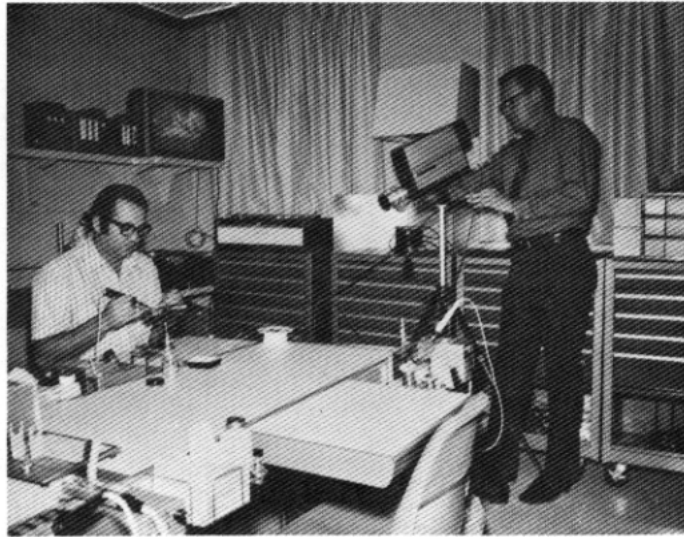


Fig. 9. TV recording for production of video training cassettes

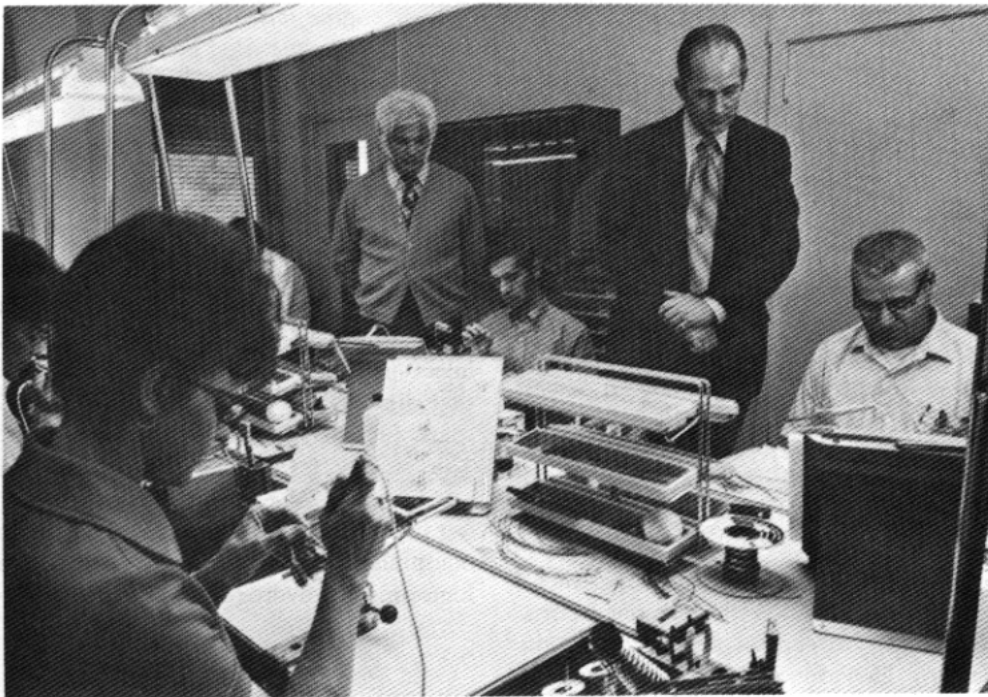


Fig. 10. Training school is periodically audited for conformance to establish criteria