



# **Maintenance and Repair Manual for Private Micro-hydropower Plants**

Prepared by

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## **Preface**

This manual has been prepared as one of a series of four manuals for the various groups of technicians and professionals engaged in the design, survey, feasibility study, manufacture, installation, management, operation, and maintenance and repair of private/community-based micro-hydropower (MHP) installations in the Hindu Kush-Himalayan region. The main reason for preparing the manuals was the felt and stated need of such groups for whom there are few opportunities for adequate training or advisory back-up. The lack of such opportunities and support is now recognised to be one of the main reasons why such schemes are less successful than hoped. At present, many schemes are being designed, installed, and operated by people who have not had sufficient opportunity to acquire the necessary skills.

The current manual is aimed primarily at managers and operators who have to carry out maintenance and minor repairs and organize major repairs in remote and under-developed mountain areas. It is hoped that this manual will provide some assistance to these professionals as a reference document. As the intended readers of the manual may have had a somewhat limited formal education, an attempt has been made to keep the contents simple. However, there is always a problem of balance between simplifying so far that the information is no longer useful, and the information being so complicated that those who need it are unable to use it. We have tried to achieve the optimum balance.

All the manuals, including this one, have been prepared as a component of the project 'Capacity Building for Mini- and Micro-Hydropower Development in Selected Countries of the Hindu Kush-Himalayan Region - Phase II'. The project has been generously funded by NORAD and implemented by ICIMOD. The first draft of this manual was prepared by DCS -Technology Development, Butwal, Nepal and was revised by Dr. A. A. Junejo, the Project Coordinator of the MMHP project, with the help of field staff from DCS. DCS-Technology Development performed an admirable job in providing all the necessary information in one document and identifying a wide range of possibilities for damage and methods of repair. The revision was based on the recommendations of the Consultative Meeting of Regional and International Experts held in February 1998. ICIMOD is grateful to DCS and its field staff for their inputs and hard work.

This is a first attempt to produce and publish manuals such as these for user groups; and it is quite possible that some important aspects have been overlooked, or some

information not provided in the most effective way. We would very much welcome receiving any comments and suggestions for improvements or additions for subsequent editions from users of the manual, experts, and institutions concerned with MMHP. It is hoped that translated into the relevant languages, this manual will be a significant source of practical help.

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# Abbreviations and Acronyms

ACSR	:	Aluminium Conductor Steel Reinforced
AVR	:	Automatic Voltage Regulator
ELC	:	Electronic Load Controller
HKH	:	Hindu Kush-Himalayas
IGBT	:	Induction Gate Bipolar Transistor
IGC	:	Induction Generator Controller
MCB	:	Miniature Circuit Breaker
MCCB	:	Miniature Coil Circuit Breaker
MHP	:	Micro-Hydropower
OVT	:	Over Voltage Trip
srpm	:	Revolutions Per Minute

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