

## Solar energy powers mobile radio repeaters

Radio repeaters powered by solar energy are part of a project recently completed by Marconi Communication Systems Limited in the Wadi Hadhramaut, Peoples' Democratic Republic of Yemen.

The Wadi Hadhramaut, stretching for nearly 200 miles into the Empty Quarter from the east coast, is the largest of the many valleys that crease the face of Arabia. Over a mile deep, it meanders along throwing off side-wadis almost casually. They are equally deep and tortuous. It is a fertile valley with scattered towns and villages nestling amongst their palm-groves in protected corners. It is historic too, as the 'lubaan' trees, creators of incense, attest; for this was Saba, the land of the Queen of Sheba whose relics, ruined cities and countless carved inscriptions can still be found.

A power house near Shibam, towards the centre of the Wadi, provides electricity for the settlements, and Marconi Mobile Radio received a contract to provide a mobile radio network for the Public Corporation for Electric Power. Comprising base-stations at the Power-House and at the towns of al-Ghuraf and al-Qatan, some 40 miles east and west respectively, the network was designed to provide the Corporation's maintenance engineers with radio contact whilst travelling between the various areas serviced by the power station.

The problem of providing coverage into the side-wadis, and along the winding course of Wadi Hadhramaut itself, was resolved by the provision of two repeater sites, located so as to provide maximum coverage of this difficult area. Roughly sited by map at Chelmsford, they were surveyed in the

Wadi Hadhramaut by Installation Engineer Clive Warner who located one, as planned, at Buheira near Shibam, and then resited the second near al-Ghuraf, making the base-station planned for that location redundant. This base-station was redeployed to a fresh site at Tarim where it enables the maintenance engineers to extend contact into two side-wadis it had previously been thought impossible to cover.

Power is available to the base-stations through the local grid but both repeaters are remote. The cost of supplying a mains power supply was far more than that of providing solar

panels. These, fitted on top of the repeater housing, make use of abundant local sunshine to charge the batteries used to operate them at night, as well as providing power for day-time operation.

Both repeaters can be converted to base-station use merely by plugging in a handset and 2-channel operation ensures a flexible and reliable system. It was inaugurated on 17th March, 1982 after a total installation period, including surveys, of less than six weeks. So successful has it been that Marconi Mobile Radio is now actively involved in replying to a number of other customers for similar systems.



*One of the two repeater stations. The solar panel can be seen on top of the building*

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## Marconi mobile base-station is tops

Sales of the new RC782 v.h.f./a.m. base-station are going well. The largest single order so far has come from the Eastern Electricity Board, which has installed some 30 base stations to cover its extensive operational area. A computerized interface enables the engineers to call in to the particular internal telephone extension they require in any of the area offices using the radio, and to be connected as for an ordinary call without manual assistance.

The RC782 is designed for cost-

effectiveness, reliability, ease of operation and maintenance. A new design of circuit in the modulator amplifier adjusts the depth of modulation automatically when output power is altered, and the entire transmitter operates on just two printed circuit boards. The receiver, with one printed circuit board, is a single conversion superhet.

This new equipment, closely related to the new RC742 v.h.f./f.m. base station that is also enjoying much success, is another example of the low-cost,



high-quality systems from Marconi Communication Systems. It is designed and built by Marconi Mobile Radio at Chelmsford.

## A royal occasion for Marconi

The Sagarmatha INTELSAT Earth Station at Balambu, near Kathmandu, Nepal was inaugurated on the 7th of November 1982, by HRH Prince Gyanendra who spoke to HRH Prince Charles, at his residence in the UK, over the satellite link.

The earth station was built by Marconi Communications International Ltd., with the Crown Agents (London) acting as consultants to the customer, Nepal Telecommunications Corporation (N.T.C.), for the purpose of providing highly reliable external communications. Marconi was responsible for all aspects of the turnkey contract. These included provision of the earth station buildings and antenna foundations, manufacture, installation and test of the communications equipment, both at the earth station and at the International Telephone Exchange in Kathmandu, provision of the antenna and the microwave radio system linking the earth station with Kathmandu.

The project took nearly two years to complete under difficult circumstances. The final result has been to give Nepal greatly improved communications which will allow it to develop its contacts with the outside world which hitherto have been provided by h.f. radio through India.

As well as engineering the whole project, Marconi provided a full training programme for the Nepalese engineers and technicians who will be responsible for running the site. This training was given both at the Marconi factory in Chelmsford, and on site as the project proceeded. In addition to this training the NTC have contracted for a highly skilled Marconi engineer to provide assistance to the local staff for the first year of earth station operation.

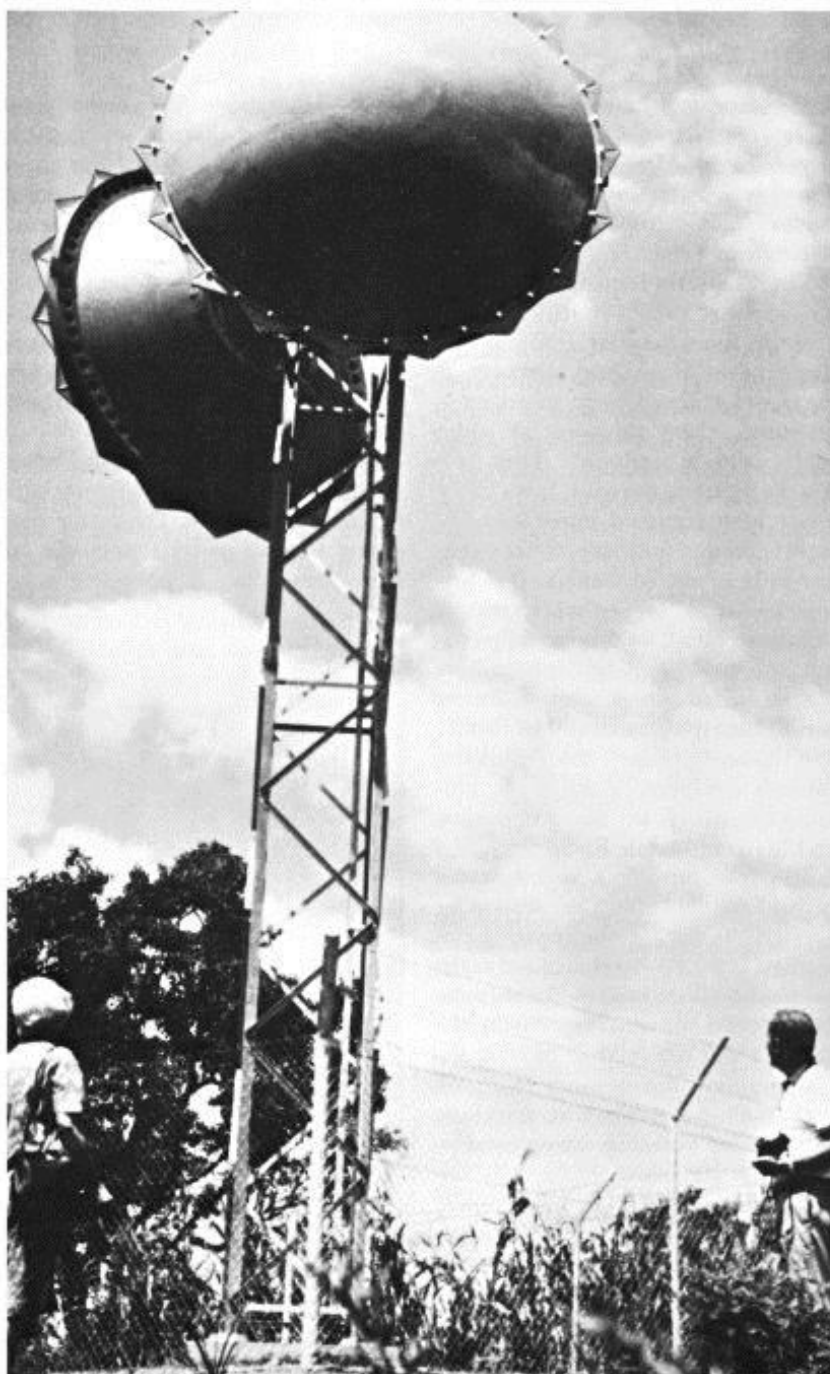
Nepal now has a facility that can ultimately provide 60 channels for direct communication via telephone and telex and can be expanded to include television, and has joined the ranks of those countries using the INTELSAT system for external communications.

Marconi Communication Systems is a major supplier of satellite ground stations and equipment, having built over 40 terminals throughout the world ranging from Standard A systems, using 32m antennas, to 3m data terminals. As a major systems company it

has been involved as main contractor in all the British Telecom Earth Stations at Goonhilly and Madley. These include Standard 'A', Standard 'C' and Inmarsat terminals. Current contracts include a new terminal for Eutelsat operation, as well as major upgrades and conversions for t.d.m.a. working.

Other current Marconi projects include two additional Standard 'A'

terminals for Hong Kong, one Standard 'A' terminal in Bermuda and a special version of a Standard 'B' terminal in Masirah. Recently completed is the supply of four 3m data terminals for use in Project UNIVERSE which is a project designed to investigate the requirements of business systems using satellite communications for data transfer.



*View of the repeater station on the link from Kathmandu to the earth station*



## Major export order completed

Over one hundred base stations form part of a major, multi-million pound contract recently completed by Marconi Mobile Radio.

The order provides the overseas police force for which it is destined with one of the most sophisticated mobile radio networks imaginable, enabling foot, vehicle and motorcycle patrols in a very large but congested urban environment to be controlled effectively.

The photograph shows three Marconi employees, Mike Southall, Peter Etheridge and Dick Parson with one of the control consoles at Chelmsford, prior to its delivery to the customer.



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## New Zealand orders Marconi NTC-1

The Royal New Zealand Navy has placed an order with Marconi Communication Systems for a new high frequency communications system for HMNZS Wellington. The NTC-1 system ordered will replace elements of the older Marconi ICS-1 system currently fitted to all three 'Leander' class frigates operated by the RNZN.

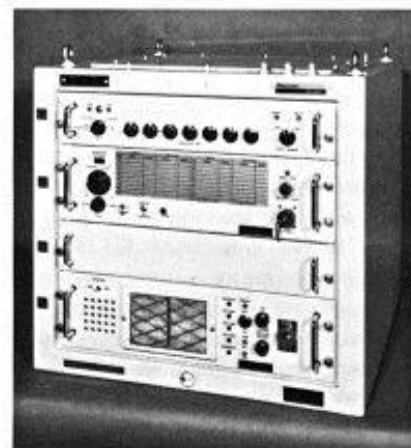
The approach adopted will allow for the phased updating of the ship's existing system at minimum cost and in the minimum time, during a planned refit. The contract also calls for detailed interface design and for the supply of installation information so that the work can be carried out by the RNZN in New Zealand.

NTC-1 is an advanced, private venture design by Marconi, incorporating

many of the features of Marconi's very successful ICS3 system into a more compact configuration. Because of this NTC-1 has been adopted and ordered by the Royal Navy for its submarine fleet, and has subsequently been specified as the base-line equipment for the Type 2400 patrol submarine.

A fully integrated NTC-1 system provides the command and the combat system controllers aboard ship with a full range of l.f./m.f./h.f./v.h.f./u.h.f. external circuits, together with a comprehensive internal communications network, essential for the efficient operation of the vessel. Since NTC-1 can be supplied complete, as sub-systems or as individual equipments it provides a very flexible means of carrying out a phased and cost-effective

update, such as is planned for HMNZS Wellington.



*A Transmit Drive Unit Type H4641, one of the units being supplied with this order.*

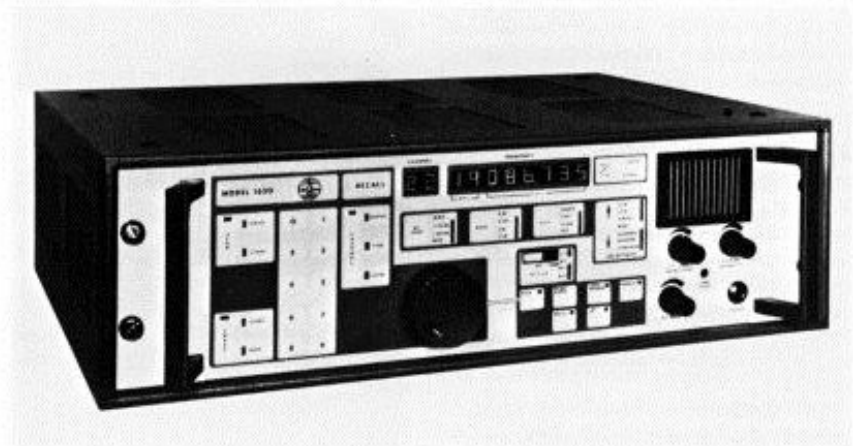
## Introducing the 1650 Receiver

Simplicity and sophistication are the two key notes of an entirely new range of high-performance radio communication receivers from Eddystone Radio.

Designed for the professional user the new range, of which the 1650 is the first to enter production, provides users with a highly sophisticated equipment that is extremely simple to operate, all at a very low unit cost.

A microcomputer built into the receiver enables a wide range of operational features to be included, and a simple protocol allows for each to be called up by a single keying action. The frequency range of the 1650 is between 10kHz and 30MHz in synthesized steps of 5kHz. It is suitable for a.m. s.s.b and c.w operation and other modes can also be accommodated. Seven separate band-widths can be made available on each receiver, of which one can be for maritime use.

The store can handle up to 100 frequencies and their associated control settings in numbered channels. These



settings can be made whilst the receiver is operating without interrupting reception. Stored channels can be scanned or two adjacent channels can be swept at adjustable rates. Remote control is possible, and the store can be programmed by sources such as bar-code readers or mimic receiver control units.

Eddystone Radio, a Division of Marconi Communication Systems, is

one of the most respected manufacturers of high quality communications receivers for professional use. Equipments are in service throughout the world in a wide range of applications, ranging from noise-level surveillance to broadcast quality monitoring. They are in great demand by top-class radio amateurs and others for whom the exceptional quality of the received signal is essential.

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## More Home Office P.M.R orders for Marconi

Marconi Mobile Radio has received another order from the British Home Office for the 770H base station. 65 sets are to be supplied, bringing total Home Office orders for this equipment to more than £250,000.

The 770H is widely used in police command and control networks throughout England and Wales. It is

an a.m. equipment intended for single or two channel working, either simplex or duplex, and can be controlled locally or by remote means.

When coupled with the Marconi RC1210 amplifier, the power output can be increased to 30W, making it an ideal option for flexible range systems. The equipment can operate from a

mains a.c. supply or from 24V d.c.

Selective calling, vehicle identity and status and talk-through facilities are all available with the RC770 series and make this base station a highly practical solution to most mobile radio requirements.

## Marconi mans the pumphouses

Thirty-five unattended sewage pumping stations in the South Northamptonshire District Council's area are to be monitored by a remote radio network. The Council, acting as agent to the Anglian Water Authority, has just placed an order for the system with Marconi Mobile Radio to provide a sophisticated microprocessor-controlled monitoring and alarm system.

Untreated sewage, if not contained, can present serious risks to public health. Furthermore, it has to be transported to the treatment sites by pumping it along a complex sewage system. Failure at any of the pumping stations could create untold problems. So Marconi Mobile Radio has been contracted to provide a system which will not only monitor pumping station

performance but will also inform, automatically, the manned control centre so that an engineer can be despatched to deal with any emergency.

Based on two new equipments from Marconi, the RC627 v.h.f./f.m mobile and the RC1307 intelligent alarm unit, which are both to be deployed at each unmanned site, the system includes a control unit at the Council offices where a large visual display unit and 'hard-copy' printer will provide all necessary information as and when required. This control is not manned out of working hours so Marconi Mobile Radio is also providing two transportable control stations. Complete with hand-held visual display units, they will enable the duty control-

ler to be on the air at all times, and wherever he may wish to go within the region, controlling the network as though from the office.

Marconi Mobile Radio is a major international supplier of mobile communications systems. These range from the London Ambulance Service and other utilities, both in the United Kingdom and abroad, to business communications either in the car radiophone or mobile radio market. The Division is well-equipped to undertake highly complicated systems and a typical example is irrigation control in desert areas, often involving the use of solar energy to power remote stations.

## A follow-up order from the Greek Navy

Marconi Communication Systems received an order in the region of £1 million from the Hellenic Navy for support equipment for their integrated communication systems.

This Marconi-built communication system is already installed on the

Greek Navy's Dutch-built Kortenaer frigates.

Known as ICS3, it is an integrated naval communication system designed and developed by Marconi and is also in operation with the Royal Navy, Dutch Navy and the Nigerian Navy.

The system incorporates the world's most advanced technology in naval communications, that meets fully the specific needs of both large and small navies with different classes of ship.



*A Kortenaer frigate of the Royal Netherlands Navy*



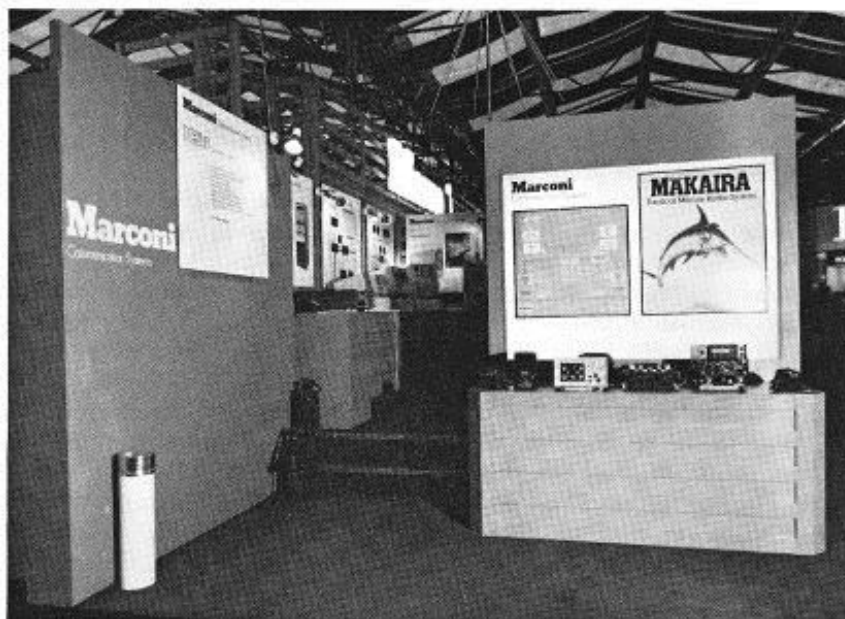
## Makaira

Makaira, a new tactical marine communication system, was put on show for the first time at the 1983 Royal Naval Equipment Exhibition (RNEE) at Portsmouth in September 1983.

Makaira is designed to provide patrol craft, air/sea rescue, customs, police, fishery protection vessels and the like with a capability of communicating in the naval, military and air frequency bands.

Based upon well-proven equipment, Makaira is highly adaptable and the number of standard components that go to make up a system may be varied to suit individual customer's requirements. It is a frequency hopper to prevent interception and jamming and can also be supplied, in certain circumstances, with cryptographic protection.

Working in the frequencies from 1.6MHz to 400MHz it is capable of a range of up to 200 miles. Two separate transceivers form part of the basic system, one covering the frequency band 1.6MHz to 30MHz, the other covering three ranges, 30-88MHz, 108-174MHz and 225-400MHz. Guard receivers are incorporated in the v.h.f



*View of the Makaira display at RNEE, Portsmouth*

and u.h.f air bands.

On show was a typical small ship arrangement. This system working around two transceivers, the AD3400 and the H4810, allows for one local and two remote operating positions plus loudspeaker reception. The AD3400 transceiver covers the higher bands and twenty pre-set channels can be programmed. The H4810, 100W

transceiver covers the lower band and has facilities for ten preset channels. The operator control units provide for access to h.f or v.h.f/u.h.f radio and intercom and, in addition, a selection of working and monitoring channels. The loudspeaker amplifier has a switch selector for two radio signals, intercom and an external a.f signal.

## Marconi export success to Australia

*First major export success for Marconi Data Network Equipment*

Marconi Communication Systems has just received an order with GEC Australia for the supply of Advanced Digital Data Network Equipment\* to Telecom Australia.

The order, won against international competition, means that GEC Australia and Marconi will be supplying equipment to improve and expand data communications over the period 1984/85 to 1988/89.

The initial development of the equipment, to suit the Australian Digital Data Network, will be undertaken in the U.K. and Australia. Full manufacture will be transferred to Australia at an early date. A new factory, at the GEC industrial estate in Sydney, will be fitted out with production and test facilities similar to the highly successful production plant at Chelmsford.

Marconi Communication Systems is already the major supplier of Kilo-Stream equipment to British Telecom and it is as a result of the sophisticated design and development work carried

out on this equipment that the company has been able to offer a highly efficient, economic, and well-proven system, to fully meet the present and future needs of Telecom Australia.

Mel Ward, General Manager, Commercial Services, Telecom Australia said that the Digital Data Service (DDS) has been an outstanding success to date. The high level of demand now required would mean rapid network expansion, as most national governments and private organizations already use the service.

The Australian Digital Data Network (DDN) is a public leased line data service which was introduced by Telecom Australia at the end of 1982. It provides fixed point-to-point and multipoint data circuits using digital transmission techniques throughout. The long haul transmission is over digital line systems, data over voice, data on radio, and digital radio systems.

The DDN equipment is located in DDN centres (exchanges) and on cus-

tomers' premises. The customers' premises house a Network Terminating Unit (NTU) which provides termination to his DTE. Data rates of 2.4, 4.8 and 9.6kbit/s are offered with either an X21 or X21 bis format. The NTU uses differential diphas modulation to communicate over a conventional unloaded cable pair system to the local exchange. The NTU is a self contained unit utilizing VLSI (Very Large Scale Integration) and microprocessor techniques to achieve a cost-effective reliable design.

The exchange equipment comprises two main items. A ZDME (Zero Order Digital Multiplexer) and MJE (Multipoint Junction Equipment). The ZDME multiplexes a number of separate users, utilizing varying rates, into a CCITT Rec. X50 frame format for transmission at 64kbit/s. The MJE provides for multipoint working on a contention basis. Both these equipments comprise one shelf of units and their operation is microprocessor controlled.

## Marconi codecs now available

Marconi Communication Systems announces the availability of its new range of codecs. Providing flexibility between f.d.m (analogue) and t.d.m (digital) systems at a much lower cost than can be achieved by transmultiplexers, these Marconi codecs offer an interface which enables existing networks to be utilized for digital working. Two types are offered – supergroup codec and hypergroup codec.

The supergroup codec encodes an f.d.m supergroup (60 channels) for transmission on an 8448kbit/s digital signal, and carries out the complementary decoding function. Similarly the hypergroup codec carries out the same functions for 15 supergroups and encodes on a 68Mbit/s digital signal.

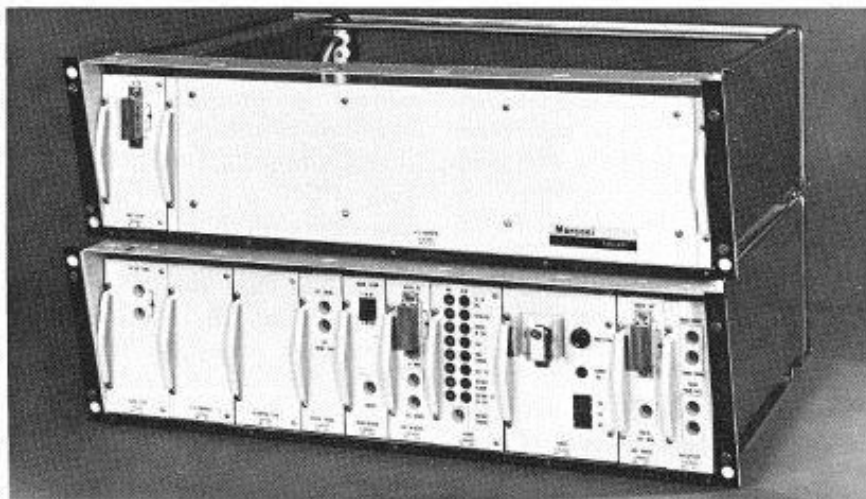
As well as being cheaper than transmultiplexers, the supergroup codec is transparent to groupband data and to both inband and outband signalling. It also meets CCITT per-

formance requirements for an f.d.m line system.

A particular application for hypergroup codecs is the linking of f.d.m transoceanic cable systems to a Gateway exchange using digital line or

radio links.

Digital technology can now be introduced, relatively cheaply, into analogue circuits to improve cost effectiveness, performance and reliability.



*The Supergroup codec Type U9201*